

The Iron Age

A Review of the Hardware, Iron and Metal Trades.

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The Hay Process Steel for Structural Purposes.

For some years the attention of engineers has been turned to the great advantages to be obtained by the use of steel for structural purposes. Its greater strength permitted of a large reduction of section—enough, it was believed, to cover the increased cost of the material. In many forms this reduction would equal in weight 30 per cent. It has been mainly to the steel produced by the Bessemer and open-hearth processes that these efforts have been directed, as they are more readily produced in the masses required and are cheaper than crucible steel. Two obstacles, however, have stood in the way of their extended use for building purposes, the first difficulty being one of manufacture. The problem was to produce uniformly a steel of high tensile strength, "low" or "mild" enough to best answer the purposes to which it would be applied—that is, a steel was wanted with the high tensile strength of steel, the elongation and reduction of the best wrought iron and greatest uniformity.

The second obstacle to its use has been the lack of full and reliable data for the calculation of strains. This want has compelled engineers in using steel to make their specifications as though they were using iron—or, in other words, they have not been able to take advantage of the superior strength

range of ductility and carrying power is attained, it will force the attention of constructive engineers to use it much more extensively in all cases where strength and lightness are required."

The steel made by Messrs. Hussey & Co., of Pittsburgh, by what is known as the Hay Process—so called from its inventor—seems, so far as tests have been made (some of which are given below) to fulfill all the requirements of a steel for structural purposes. It is low steel with a high tensile strength (45 to 50 tons), and with an elongation and reduction equal to the best irons. Through the courtesy of this firm we are enabled to give some description of this steel and the tests made of it for use in the Glasgow, Mo., Bridge. This steel is produced by the following process: The pig iron is decarbonized in the usual manner. When still in a molten state, an addition is made of a certain percentage of a matte or sponge, containing a number of metals and metalloids, brought to the metallic state by a process patented by Mr. Hay, in a furnace of peculiar construction. This matte is prepared by the Hay Steel Company, who have a contract with Hussey, Howe & Co. for its exclusive use for the manufacture of steel. The mechanical action of the matte is to produce a more thorough and intimate union of the particles by the removal of all vestiges of cinder. Just the method of its action, as well as the exact influence of the constituents of the matte and the proportion

steel beams, angles and eye-bars have been used. The rolling of these forms has been accomplished under the direction of, and by the machinery patented by, Mr. A. Kloman, and constitutes an entirely new departure, the eyes being formed without welding.

The Glasgow Bridge is erected over the Missouri River at Glasgow, Mo., on the line of the Chicago and Alton Railroad. It is a Pratt truss bridge of five spans of 314½ feet each, three being above grade, or through spans, 50 feet above high water, and two below grade, or decked spans, the grade of the track on these descending 45 feet to the mile. The bridge has a clear width of 16 feet, and a clear height of 21 feet. The requirements were that the steel should be uniform, both as to analysis and mechanical test, tough and ductile at all temperatures from 120 to 30 degrees F., capable of sustaining without fracture, in the sizes and shapes actually required, 80,000 lbs. to the square inch of original section. The elongation was to be not less than 10 per cent., and the reduction of sectional area 20 per cent. When strained to 45,000 lbs., the metal was to stand a smart blow of a blacksmith's hammer without permanent set. It was also to be capable of being bent cold, in a round bar 1½ inch in diameter, through 180 degrees around a cylinder 1 inch in diameter, to weld soundly, and stand a compressive strain of 48,000 lbs.

These tests and requirements, it will be observed, were very severe, and to meet

reduced cross section, 9-16 in. diam., 0.25 sq. in.; reduction at fracture—43 4-10 per cent.

Test No. 8, July 27, 1878.

Bar hammered from billet, 2½ x 2½ in. (See Fig. 6.) One eye bar, 2 x 1-32 in. — 5 ft. 4½ in. long. Width of eye pin, 2½ in. Area of cross section = 2.0625 in.

Strain, per sq. inch.	Elongation, 36 inches.	Permanent set, in 36 inches.	Remarks.
30,000	0.0225	0.0000	Modulus elasticity = 32,000,000.
30,000	0.0425	0.0000	" " = 33,800,000.
40,000	0.0600	0.0000	
40,000	0.0650	0.0000	Modulus elasticity = 27,700,000.
50,000	0.0650	0.0000	
50,000	0.0675	0.0000	
50,000	0.0700	0.0000	Trace.
50,000	0.0825	0.0000	Permanent set.
60,000	0.0825	0.0000	Bar was released from strains.
60,000	0.0825	0.0000	Bar broke near head (See Fig. 7.)

Ultimate permanent extension, 10 per cent.

Test No. 9—Tensile Strength—Aug. 5th, 1878.

Bolt 1 in. diameter, with thread cut each end—American standard—with wrought nuts 2 in. long, as per sketch (Fig. 8). Diameter at bottom of thread = 13-16 in., broke at bottom of thread. Area at bottom of thread = 0.518 sq. in. Broke with 58,000 pounds total strain = 111,969 pounds per sq. in. Elongation of bolt in 12 in. = ¾ in.

age elongation of bar = 9-10 per cent.; maximum do. = 12 per cent.; minimum do. = 8½ per cent.

It is hardly necessary to comment on these tests. In every case where it is possible they exceed the requirements. They show a tensile strength of 90,000 to 100,000 pounds, elongation something over 10 per cent., and a reduction of 34 to 44 per cent.; that is, they show that this metal possesses all the strength of steel and elongation and reduction of iron, and, if they prove anything, prove that this material is admirably adapted for structural purposes.

Some tests have been made with this steel in chains that show very good results. The Stirling Chain Works, of Buffalo, N. Y., made some tests of chain on their machine with the following results:

Size.	Reduction.	Stress. Tons.
¾ Round steel.. 1-32 full	1-32	23
¾ " " " 1-64 "	1-64	33
¾ " " " 1-64 "	1-64	42

Only sand was used as a flux, and the fracture, which were clean, crystalline and bright, showed that the welds held. At the Chicago Chain Works of S. G. Taylor, the Hay steel was used for a chain for a dredge, being worked the same as iron, except that the steel required more labor. When tested, the chain broke at 35 tons, while the best chain of this size required to stand but 24 tons, and ordinary 18 tons admiralty proof test. Before closing this article, we wish to again refer to one of the main obstacles that has always presented

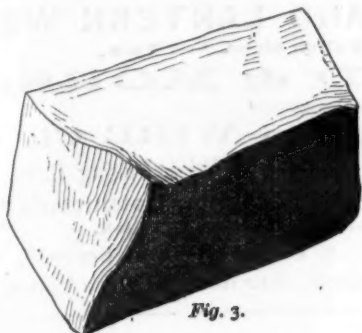


Fig. 3.

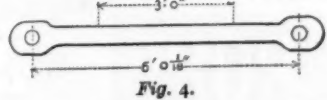


Fig. 4.

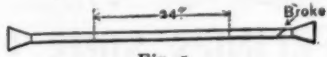


Fig. 5.

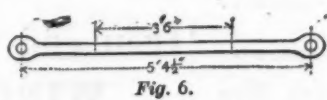


Fig. 6.

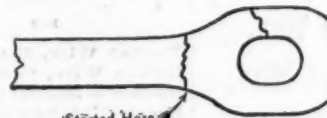


Fig. 7.

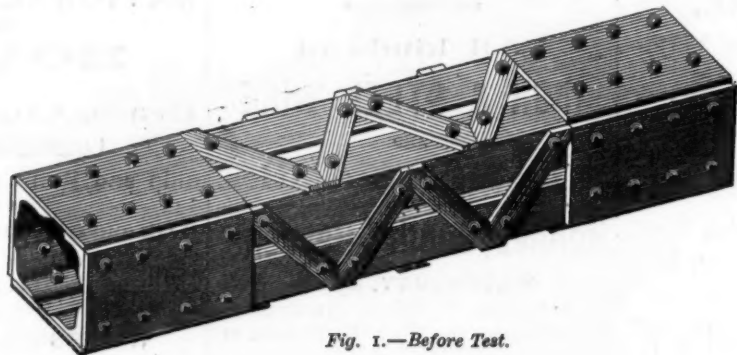


Fig. 1.—Before Test.

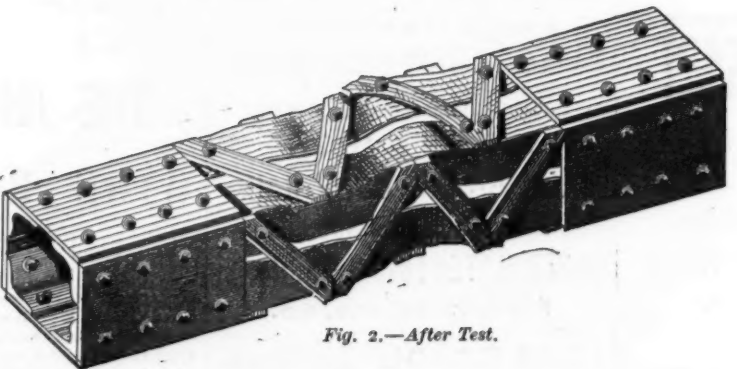


Fig. 2.—After Test.

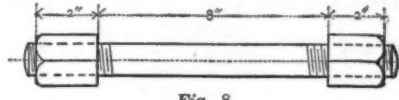


Fig. 8.

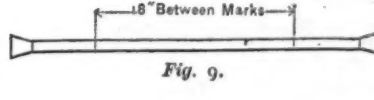


Fig. 9.

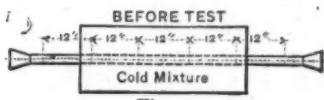


Fig. 10.

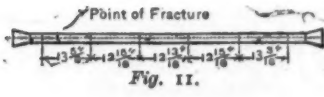


Fig. 11.

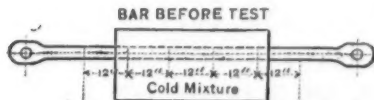


Fig. 12.

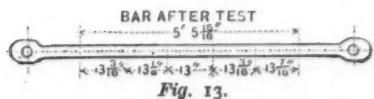


Fig. 13.

TEST GIRDERS, BARS AND BOLTS OF HAY STEEL, FOR THE GLASGOW (MO.) BRIDGE.

of steel, because of this want of knowledge as to the exact degree of its superiority. To this may also be added a want of confidence in the uniformity of the material. In England, where more attention has been given the subject than in this country, the Board of Trade has recently, after considerable pressure had been brought to bear upon it, recognized steel as a material for bridges; but it has put the limit of strain at 6½ tons per square inch only, and thus gave no encouragement for the employment of the high-class material. It seems as though a material that has a tensile strength of 45 to 50 tons ought to be admirably adapted to bridge building and kindred purposes, if the material is uniform and has a good reduction and elongation. That such material can be had, the admirable paper read by Mr. Adamson before the recent meeting of the Iron and Steel Institute at Paris, is decisive proof.* This paper gives the most thorough tests of mild steels ever made, and shows that even comparatively hard steels, with one-half per cent. of carbon, .01 per cent. of manganese and small proportions of sulphur, silicon and phosphorus, required 20 tons to produce a permanent set, and had a maximum strength of 53½ tons per square inch; being, therefore, twice as strong as the double best Yorkshire iron, while it elongated 14½ per cent. Instead of objections, there are many points in favor of the use of such steels for bridges, roofs and similar structures. If this is true of a steel as hard as .50 carbon, it is evident that a mild steel having all these properties will be still more applicable to these purposes.

Mr. Adamson admirably sums up these points in the following manner: "From the experiments made on the properties of iron and steel, it will be apparent that the users of metals must, as it were, make some natural selection to secure the highest and best results for any special purpose; and it will also be clear that no wrought iron can resist concussive force equal to mild steel; and as a much higher

of these constituents absorbed by the steel, have not yet been fully determined; but enough has been developed to show that the product is admirably adapted for structural purposes.

The Glasgow Bridge to which we have referred, is the first bridge in the world, made entirely of steel, in which advantage is taken of the superior strength of steel, and much credit is due to Gen. Wm. Smith, the engineer, for his courage in adopting steel as the material for its construction. Not one pound of iron has been allowed in it: the fish bars, lock nuts, track bolts and spikes, as well as the superstructure, all being steel. The track stringers, ties and hand rail are wood. The entire balance of the superstructure is made of the Hay steel.

We have said that this is the first bridge in the world, made entirely of steel, in which advantage is taken of the superior strength of steel. There are in Europe at least two steel bridges—one in Sweden and one over the Douro, in Portugal—but they are built as though the material were iron.

This country possesses three bridges the larger part of which is steel. One in California, a small iron suspension bridge of some 200 feet span, and the St. Louis and East River bridges. The former, the St. Louis Bridge, is generally supposed to be a steel bridge, but the facts are that not half the metal is steel. There were used in its construction 4,916,538 pounds of steel, 6,914,681 pounds of wrought iron and 513,686 pounds of cast iron. The steel was used for the arches, and the wrought iron for coupling the arches for the wind trusses and skew-backs. The metal in the Brooklyn Bridge, so far as it has been put in, is all steel, with the exception of the anchors; 6000 tons of iron, however, had been asked for at the time work was suspended. Should it be resumed, steel must be used instead of iron.

In these two bridges the steel used was in the form of plates or wire, not in what may be termed structural shapes; so that the Glasgow Bridge is not only the first all-steel bridge in the country, but the first in which

them with steel, especially so. Messrs. Hussey, Howe & Co. undertook not only to make the steel but to roll the shapes, and have succeeded. Out of over 200 blows not one has been rejected.

We give below the tests as made by the American Bridge Company, who have the contract for the erection of the bridge:

"HAY" STEEL TESTS.

Compressive Test No. 1.

CHICAGO, July 31st, 1878.

Strut composed of 4 angles 2½ x 2½ x 5-16 in. = 1.465 sq. in. each. Total 5.86 sq. in. Buckled with 420,000 pounds total strain = 71,672 pounds per sq. in. No rivets broken, one of the lattice bars broke across a rivet hole.

The following illustrations (Figs. 1 and 2) show the strut before and after the test.

Compressive Test No. 3, July 31st, 1878.

Bar 1½ x 1½ in. x 3 in. long, sq. ends, with 210,000 pounds total strain, or 134,600 pounds per sq. in., was crushed as per sketch (Fig. 3).

Test No. 5, July 26, 1878.

Bar, 5 x 1-9-16 in. x 6406 sq. in. Pin, 3¾ in. (See Fig. 4.) 307,408 pounds total; 48,000 pounds per sq. in. Elongation, 65-100 in. Permanent set, 0.003. Was strained to 90,000 pounds per sq. in., when testing machine broke. Elongation in 3 ft. = 2½ in. 576,000 pounds total strain. Put in machine again, gave following result: Elongation in addition to above, 5-16 in. Total, 2 15-16 in. Ultimate strain, 588,000 pounds total, or 91,760 pounds per sq. in. Reduction at break, 4¾ x 1 3-16 in. = 11¼ per cent.

Test No. 6, July 26, 1878.

Round bar, ¾-inch diam., 0.442 sq. in. (See Fig. 5.) Distance between witness marks, 24 in.; total strain applied, 21,216; strain per sq. in. 48,000; permanent set, none; ultimate strain, 47,000 pounds total, or 106,335 pounds per sq. in.; elongation in 2 ft. = 1½ in.; bar broke outside of witness marks and reduced section not included;

Test No. 10—Tension—Aug. 5, 1878.

Bar 1-inch round—0.785 sq. in. sectional area, with upset ends, as per sketch, (Fig. 9.)

Strain per sq. inch.	Elongation in 18 inches.	Set in 18 in.
30,000	1-32 in.	0
30,000	1-32 in.	traces.
50,000	3-64 in.	1-64 in.
50,000	9-64 in.	1-16 in.
80,000	1-16 in.	9-16 in.
96,600	1 13-16 in.	0

* Applied 10 times on the bar did not increase set.

† First application.

‡ After 11 applications of 80,000 pounds.

§ Total permanent elongation after break

Elastic set 53,000 lbs. per sq. in.; ultimate strain—96,600 lbs.; elongation—10.1 per cent.; diameter of section at fracture—¾ in.; reduction of area at fracture—44 per cent.

Tensile Test No. 15, Aug. 10, 1878—Made at a Temperature of 8 Degrees Below Zero.

Rolled bar, 1 in. round—0.785 sq. in. sectional area. Temperature, 8 degrees below zero. (See Fig. 10.) Broke outside of the cold mixture, with 78,000 lbs. total strain, or 99,360 lbs. per sq. in. Break and elongation shown in Fig. 11. Maximum elongation, 1¼ in. in 12 in. = 13½ per cent.; minimum elongation, 13-16 in. in 12 in. = 6¼ per cent.; diameter of reduced section at fracture = 13-16 in.; area fracture = .518 sq. in.; reduction at fracture = 34 per cent.

Tensile Test No. 18, Aug. 12, 1878—Made at Low Temperature.

Eye bar, 3 x 1-64 in.—7 ft. 5-16 in. C to C of pins; hammered from bar, 6 x 1½ in. and annealed. Sectional area of bar = 3.05 sq. in. Head, 7 in. wide; pin, 3 in. diameter; temperature, 6 degrees below zero. (See Fig. 12.) Strained to 48,000 lbs. per sq. in., no permanent set; 52,000 do.; 54,000 do.; 55,000 do., 1-16 in. in 5 ft.; 94,400 do., broke 11 in. from pin center. Elongation of pin hole = ¾ in. (See Fig. 13.) Size at point of fracture, 2 15-16 x 31-32 in. Reduction at fracture = 7 per cent.; aver-

itself when steel has been spoken of for structural or bridge purposes. We refer to the impossibility of getting a perfect eye or tension bar, the trouble being in forming the enlarged ends of such bars. The usual manner of making these enlarged ends, either in iron or steel, is to weld extra metal to the ends of the bar, and then hammer out the ends to the size required. But this welding is but rarely well done, and while apparently a good weld on the surface, the metal is oftentimes but poorly united inside. To overcome this objection, it is necessary to roll the entire bar with enlarged ends from the same billet. Mr. Andrew Kloman has perfected and patented a mill for making a solid eye bar from one billet. His patent covers the bar as well. He is now able to furnish in iron or steel what is claimed to be the most perfected eye bar ever made. The bar has a finished head, only needing the primals to be drilled, when it is ready for the structure. Messrs. Hussey, Howe & Co. have arrangements with Mr. Kloman to furnish these solid eye bars to the trade.

A new Monetary Unit in Austria.—A circular has been issued by the Treasury Department, making the eight florin gold piece the monetary unit of Austria, instead of the silver florin, as heretofore. This will require the invoices of merchandise shipped from Austria to this country, purchased in the depreciated paper florin, to be certified by comparing the value of the paper with that of a gold piece, instead of the silver florin, and will relieve the trouble for some time existing by which Austrian imports appear to have been considerably overvalued.

Mr. L. Cornesson has made a report to the municipality of Paris on the illumination by the Jablochhoff electric light, from which it appears that the cost of lighting the Avenue de l'Opéra, the Place du Théâtre Français, and some other streets, with 156 clusters of lamps, would cost almost four times more than with gas.

* This paper was published in The Iron Age, October 27, page 3.

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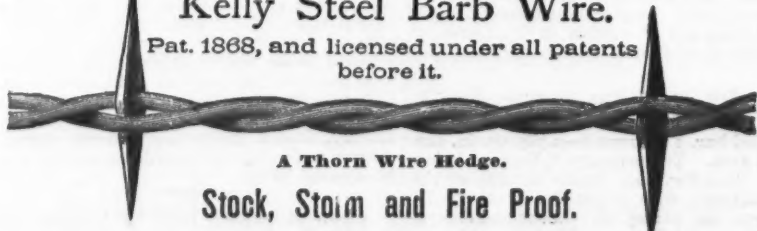
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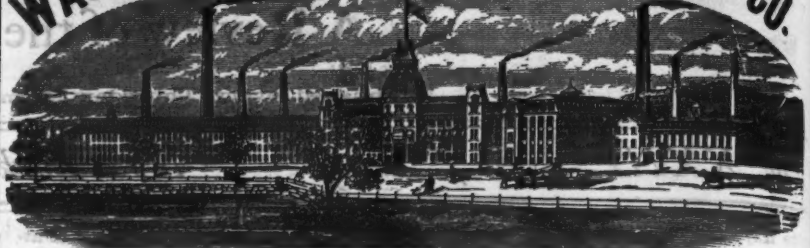
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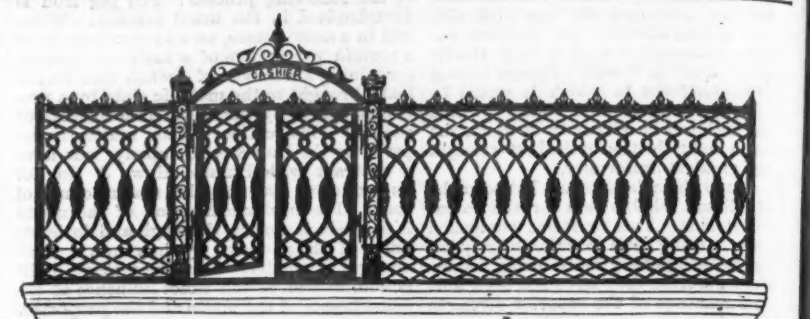
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*** At the Lowest Prices.**

While I cannot say that many, if any, of the stoves now in the market can be consid-

ered artistically good, the intelligent critic cannot fail to note the evidences of a movement in the right direction. But the men who make stove patterns have yet to learn that meaningless and inappropriate ornamentation is barbarous, and that the province of decorative art is merely to give grace and beauty to articles of utility. If, however, the ornamentation employed in embellishing an article of utility is inappropriate and offensive to good taste, it cannot fail to mar that to which it is applied. It may be compared to the streaks of red, yellow and blue with which the savage decorates his face, or the vermillion and indigo tattooing on the arm of the sailor. The value of ornament depends in a great degree upon its appropriateness; when this is lacking it ceases to be ornamental. For example, nothing can be more at variance with the "eternal fitness of things" than wreaths of flowers, leaves, vines, bunches of grapes and similar designs on hot stoves, unless it be the figures of men and animals sometimes employed. I well remember the feeling of uneasiness with which, in childhood, I regarded the sheet-iron Diana riveted to the front of the large double-heater in my father's basement—a feeling which had its origin in an intuitive perception of pre-eminent unfitness of the object for the use to which it was put. To stamp a classic female figure out of sheet iron was bad enough; to fasten it against a hot stove was a refinement of bad taste which, to the infant mind, savored of cruelty, and which gives the adult of delicate nervous sensibilities a shock not easily recovered from. Many other devices in common use as stove ornaments, though less objectionable than living forms, are as much out of place on hot metal plates as flaming torches and burning flowers would be, if printed in warm colors on light fabrics for summer wear. Wreaths, festoons, medallions containing profiles in relief, Cupids, leaves and flowers treated naturally, great ugly monograms, staring nickel panels and name plates, and a dozen other violations of good taste which might be mentioned, are what one sees in looking over the stove catalogues for 1873. There has been progress, without doubt, but it is still hampered by false traditions, and limited by a mistaken notion of the popular requirements. Take a dozen of the best parlor stoves of to-day, stand them in line and contemplate them as objects to be criticised from an artistic standpoint. What are they? Things to be tolerated during cold weather, but, in the first warm days of spring, to be banished, with a sigh of relief, to the garret. They may be all good stoves—strong heaters, economical of fuel, easily managed and generally convenient—but they are essentially ugly, and when surrounded with beautiful objects, they are as much out of harmony as a fish-horn in an orchestra. Consequently, we never find stoves considered as anything better than a necessary evil. The housekeeper with an eye for the beautiful would rather suffer the discomforts of the open fire than tolerate the stove, and even in cheap houses stoves are discarded whenever it is possible to depend upon other and less unsightly, even if less healthful, heating apparatus. I believe the time is not far distant when the stove will regain the place it has lost; when it will once more become a desirable article of parlor and chamber furniture, and harmonize with tasteful and beautiful surroundings; but it will be when the stove maker is fully in sympathy with the art development of his time, and when he has learned more than he now knows of the capacity of the materials which he can employ.

THE DECORATIVE VALUE OF BLACK.

And here let me remark in passing, that it is a mistake to suppose that because iron is black it cannot be cast into objects of beauty. People are only just beginning to appreciate the decorative value of black as a foil to color—the bass chord of color harmonies, if you please. I have given you an illustration of what can be done with black in wall treatments. Ebonized wood is the material out of which much of the best cabinet work of the day is made. We find black cabinets and side-boards, black furniture and black moldings prized as the invaluable accessories of decoration. Why, then, should we despair of the stove because it is black? If we but make it beautiful, and relieve the somber tone of its masses by the judicious employment of color contrasts, it will be found to have an art value peculiar to itself.

ART REPRODUCTIONS IN CAST IRON.

In treating of art work in stove manufacture, we must consider it as a series of reproductions of designs which are not only good in themselves and appropriate to the uses for which they are employed, but which admit of successful reproduction in cast iron. When any of these conditions are overlooked we have unsatisfactory results, and the founder is often disheartened and discouraged by his inability to attain the beauty he may honestly and intelligently seek to express. The necessities of trade demand cheapness and a large production of whatever is made for sale to the great mass of consumers. This demand the enterprising manufacturer must meet, by employing methods which will enable him to indefinitely reproduce good original art work at small cost, or to adapt, for purposes of ornamentation, good designs and appropriate devices borrowed from good work. Presuming that his taste is so far cultivated that he knows a good thing when he sees it, and can discriminate between that which is and is not appropriate for the use in which he would employ it, he is often met at the outset by the practical difficulty of cheaply and successfully reproducing the designs he seeks to employ.

IRON AS A MATERIAL

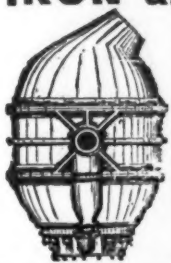
As we are dealing more especially with cast iron in this discussion, it is but fair to say that is by no means a desirable material for art reproductions, unless the designs reproduced are made with especial reference to the fact that they are to be cast in sand. Not a few of our founders have made the mistake of supposing that anything in the shape of a good design in metal could be used as a stove ornament, and pretty panels and medallions in bronze or silver have been pur-

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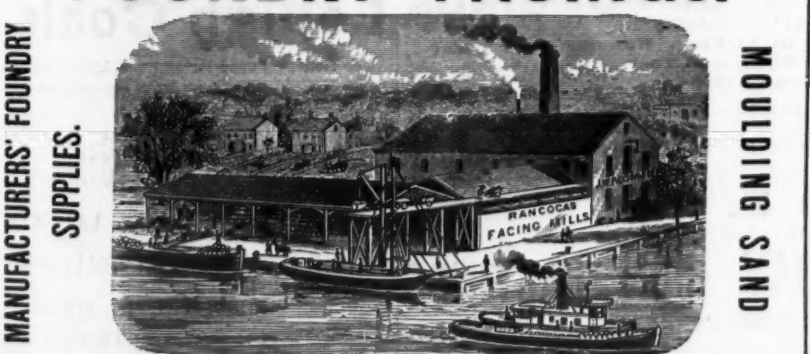
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pensive adjunct to the Furnace, Forge and Rolling
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brands for fire boxes and difficult flanging. Pig and
bar Iron, Rails and all shapes in Iron. Quotations
given on Bridge and Building Specifications.

chased for use in the pattern shop, only to
fail lamentably in the foundry. There
is a reason for this. It is almost impos-
sible to produce in cast iron a copy of
reposed work which shall be anything
more than a burlesque, and this applies
to copying such work by any kind of
casting. The nature of the work is
such that, when a casting is made from it,
the inevitable slight loss of sharpness spoils
the work. It has wholly lost its expression.
Another thing must be kept in mind. A de-
sign which looks well in a light-colored
metal like silver, nickel or tin, is likely to
become heavy, dull and uninteresting when
reproduced in a black metal like iron. The
design must be suited to the metal, or the
effect will not be good. Many of you will
remember the beautiful cast-iron pavilion of
Barnards, Bishop & Barnards at the Cen-
tennial. To me it was a revelation. It
would be difficult to imagine a better ad-
aptation of design to material, and the effects
were so good that I was deceived into sup-
posing that the castings, as castings, were
beyond comparison with any work which
could be done by American foundries. Not
long ago I had the opportunity, in company
with a gentleman prominently connected
with the stove trade, of examining some of
these castings, and we could not suppress a
laugh when we saw what rough things they
were. Probably there is not a stove found
dry in the United States where such cast-
ings would not have gone to the scrap heap,
but they were works of art, nevertheless,
and the art was all in the design. If we
had such designers as Barnards, Bishop &
Barnards are able to command, I do not
hesitate to say that there is not a stove
foundry in the United States, represented in
this association, in which smoother and finer
castings could not be made than Barnards,
Bishop & Barnards are able to produce.

BAD TASTE IN STOVE ORNAMENTATION.

When I say that at present the tendency is
to overload our stoves with ornament without
any special reference to its appropriateness
or harmony, I state a fact which must be
apparent to all who have studied the matter
critically. If we take a first-class base
burner, for example, and examine it care-
fully, we shall see that it is entirely covered
with ornament. Here we have decoration in
till you can't rest—literally—since there is
no rest for the eye, which is wearied and
bewildered by the continuous succession of
ornament. This is simply bad taste. I am
well aware that founders are inclined to be
afraid of plain surfaces in fine work, giving
as their reason the greater ease in molding
ornamented surfaces and the less likelihood
of apparent defects in the finished work. If
the production of perfect plain surfaces were
a mechanical impossibility, there would be
more force in this argument than there is;
but the fact is that in this case art is pro-
stituted to the convenience of the molder,
and simply because of a mistaken notion
that all there is of art, as applied to found-
ing, is the fineness of the castings. Not long
ago I happened into the salesroom of a
foundry where only the cheapest and com-
monest grades of goods are made. There was
but little on the floor to interest one in
search of the beautiful, as most of the work
was as bad as it was cheap, and overloaded
with tawdry ornament. But I saw there
one stove which, as an art production, was,
I am sure, the best of its class now made.
It was a small size base burner of the cheap-
est kind—rough, common, without one fea-
ture to command it except a beauty which
it evidently had by accident. The orna-
mentation happened to be good; it was spar-
ingly applied just where it was needed, and
the effect was decidedly pleasing. There are
few, if any, of our first class base burners,
resplendent in ornamentation and nickel
trimmings, which, if we could put them in a
lathe and turn off four-fifths of their deco-
ration, would not be improved, and would not
thus denuded of superfluous finery, be more
acceptable to the public than in their pre-
sent shape.

THE BUSINESS ASPECTS OF THE QUESTION.

The answer to this will be that the
founder makes stoves, not to please himself,
but to sell, and that those which are most
showy sell the best. This may be true, but
over ornamented stoves hold their own in the
market only because they do not encounter
the competition of stoves which are really
beautiful, and which commend themselves
even to the uneducated eye as objects of
art. The class of people who buy first-class
stoves at all, know and care a great deal
more about beauty than is commonly sup-
posed, and when it is offered them they will
recognize and buy it.

If I am wrong in this, and if, as some
manufacturers profess to believe, the public
want "frills" for their own sake, why has
there been any attempt at art progress?
Why not return to the ideas of the venerable
Smith, who used mirrors and glass girandoles
to ornament some of his wonderful produc-
tions, or go back still further for styles to
revive? In an edition of John Evelyn's
Diary we find an entry, under date of No-
vember 27th, 1649, which reads as follows:
"Went to visit honest and learned Mr.
Hartlibb, an ingenious person, who has
propagated many useful things and arts.
He told me of the castles which they set for
ornament on their stoves in Germany, which
are furnished with small ornaments of silver,
on battlements, out of which they discharge
excellent perfumes about the rooms, charg-
ing them with a little powder to set them on
fire and disperse the smoke." Compared
with such frills as these, how flat and insigni-
ficant appears the ornamentation of to-
day, and if such things are wanted, how
easy to meet that want by going back a couple
of centuries for ideas.

In a paper of this character it is necessary
to generalize somewhat broadly, or the tem-
ptation to extend it to an unreasonable
length will be found practically irresistible.
I can, therefore, only hope to offer a few
suggestions which have been carefully con-
sidered and which I think will be found to
merit attention. It should be remembered
that my remarks apply chiefly, if not exclu-
sively, to what are known as fine and first-
class heating stoves.

SURFACE FINISH OF CASTINGS.

One of the most serious objections to the
cast-iron stove is the necessity of giving it
a polished surface with varnish or plumbago.

The latter thus imparted must necessarily
detract from the beauty of the casting. It
confuses the ornamentation and destroys
the grace and beauty of the modeling.
A dead black surface would be vastly
preferable, and, if such a surface could
be kept clean by occasionally wiping it
with a damp cloth without danger of
causing red rust spots, the labor of polish-
ing and the bad results which follow it
would be averted. A dead black surface,
proof against rust and permanent, is secured
by forming on the iron a coating of oxide
similar in composition to magnetic iron ore,
Fe₃O₄. This may be accomplished by what
is known as the Barff process, and consists
in submitting iron to the action of super-
heated steam. The skin of proto-sequoioxide
thus formed is unchangeable, and effectually
prevents rusting from the action of
moisture or atmospheric oxygen. The steam
must be superheated to 700° to 800° F. The
length of time needed for the process de-
pends upon the size of the articles treated.
As Barff's apparatus was made for another
and a very different purpose, it is somewhat
more costly and complicated than need be.
Its essential feature is a device for passing
the dry steam through tubes heated to
redness, and thence into a fire-brick
chamber holding the objects to be treated.
This chamber in Barff's plant is heated
by a fire and flues to about 750° F., but this
direct firing is probably unnecessary, as it
could be heated by utilizing the waste
gases of the cupola. After the articles are
placed in the chamber and the temperature
of 750 to 800 degrees is reached, the door
is luted with fire-clay, and the steam pres-
sure gradually increased to 40 pounds—
danger of an explosion being avoided by a
valve, properly weighted, and an escape
pipe. Iron articles coated by Barff's pro-
cess were shown at the Paris Exhibition,
and were much admired for the beauty of
their rich, lusterless, dead-black surfaces.

Another process, which gives a perma-
nent coating of oxide, called by the French,
bronzing, and applied by them to ordnance,
small arms and many other articles, em-
ploys hot air instead of dry steam. In
other respects the processes are very much
the same. The coating produced on articles
of iron subjected to a temperature of 536°
F., is said to resist emery paper and dilute
sulphuric acid. The color of the coating
obtained is greenish black, like that of old
bronze. I will not detain you with details
of the plant necessary for these processes,
but should be very happy to give fuller in-
formation to any one who may be inter-
ested. If the results are desirable as re-
gards stoves, the cost of either process is
not great enough to deter any manufacturer
from using both if he should desire to. It
should be remembered that the surfaces
thus obtained are unchangeable, and that they
will never need other cleaning than the re-
moval of dust with a cloth.

**BRASS AND BRONZE TRIMMINGS AND ORNA-
MENTS.**

The use of nickel trimmings is objection-
able. The cold blue-white color of nickel
neither harmonizes nor pleasantly contrasts
with the black it is intended to relieve. It
is discolored by heat and sulphurous gases,
and is generally a nuisance. We have two
substitutes for nickel as a coating for plates
and trimmings—copper and brass. Copper
is one of the easiest and cheapest of the met-
als to electro-deposit. Treated with proper
acid and alkaline solutions, it can be made
to resemble any shade of bronze, and bronze
panels and trimmings would be exceedingly
beautiful, as well as novel. I have long
wondered why copper was not so used, es-
pecially as its employment entails no practi-
cal difficulties, and the conversion of a nickel
into a copper-plating plant demands only a
tank to hold the copper solutions and copper
anodes. Brass plating is a comparative
novelty. It is only lately that entirely satis-
factory results have been attained in the
electro-deposition of this alloy which, next
to gold, is the most beautiful of the metals.
Brass plating demands a good solution and
careful manipulation, but it is not expensive,
and could be employed with most excellent
effect in stove ornamentation.

TILES.

As stove ornaments, tiles, judiciously em-
ployed, are entirely legitimate and appro-
priate, and may be used in a dead-black
setting with as good effect as they are now
employed in decorating ebonyized cabinet
work. It will not pay to buy them in small
lots at retail prices of importers, but they
will not be found very costly if imported in
quantity by manufacturers using them.

THE URN AND ITS SUBSTITUTES.

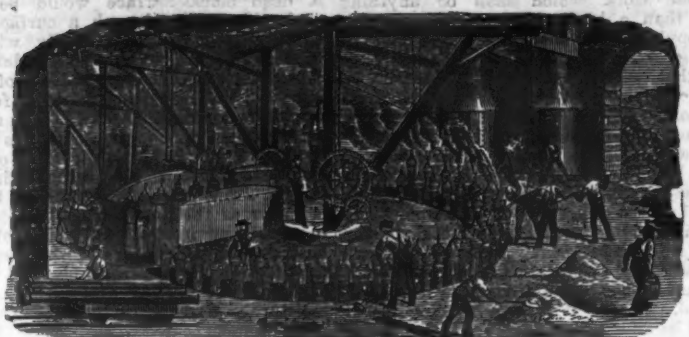
The urn has done duty for many years,
and might, with propriety, be relegated to
the catacombs from which the design was
originally borrowed. If it be necessary to
mount an ornament like a cap sheaf on
top of a stove, it should be ornamental.
During the past year we have witnessed
some radical departures from the conven-
tional idea in the matter of urns. I should
not like to say what I think of some of the
devices substituted, but there is certainly
room for further improvement. Something
light and pretty in bronze or brass plate would
be appropriate.

THE NEED FOR DESIGNERS.

I might add to these random suggestions
until I had quite exhausted your generous
patience, and all my suggestions might merit
consideration. But more than all these to-
gether is needed before we can have a real
and substantial progress in the application
of the laws of art to the manufacture of
stoves. We need good designs, and this im-
plies good designers, who are not only edu-
cated in all matters of taste and technique,
but are thoroughly familiar with the ma-
terials available and know the limitations
of the molder's art. Here we are met by a
practical difficulty. We have no such de-
signers, and the field is not one which
offers any inducements to talent. During
the fiscal year 1878, 14,000 patents were
granted for mechanical inventions and only
722 for designs. The reason for this is that
a mechanical patent gives an inventor a defi-
nite and recognized property right in his
invention; a design patent is at best of
doubtful value, and but few can afford to
employ talent in making designs when they
cannot be certain of protecting them against
infringement. This is not the fault of the

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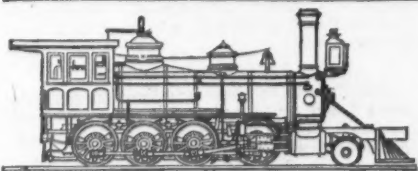
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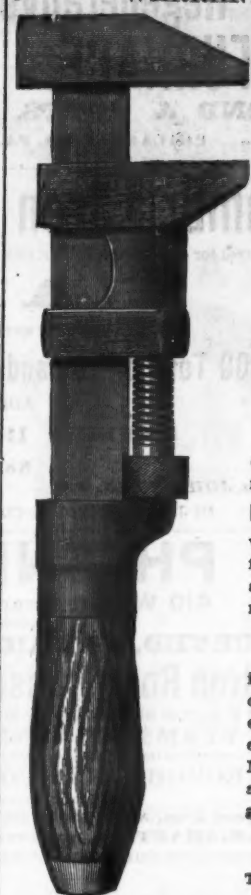
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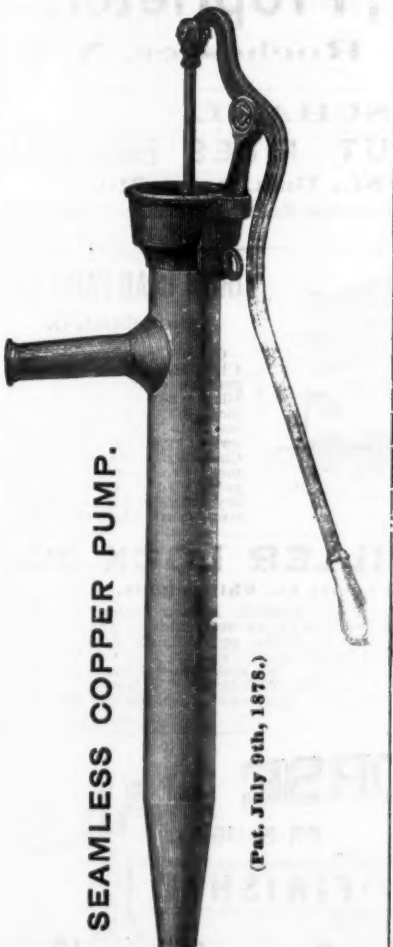
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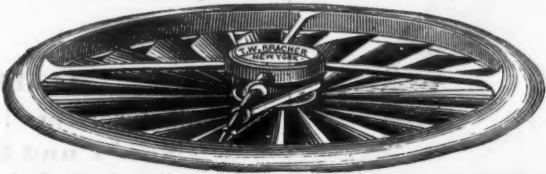
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law. The statute needs no amendment, but
it needs a clearer and more consistent inter-
pretation, and this will be reached when,
with the development of industrial art in
this country, designs become more valuable
and more effort is made to protect them.
It has been commonly believed that a design
patent was of no value beyond preventing a
close imitation—in the case of stoves, making
illegal the use of one manufacturer's plates
as patterns in another manufacturer's
foundry. It should need no argument to
show that if this be all there is to a design
patent, such a document is not what the law
intends it shall be. Has it ever occurred to
you, gentlemen, that the enormous annual
expense which the enterprising stove founder
must assume on account of patterns is very
largely, if not wholly, due to the fact that,
in order to keep ahead of his competitors, he
must discard his old ideas, however good,
because everybody has adopted them, and
strike out in new directions in order to
enjoy, for a brief season, the benefit of
having something distinctively new and
original, even if atrociously bad, to talk
about? Have you ever thought how differ-
ent, and more satisfactory, the stove busi-
ness would be if there were no poaching on
each other's preserves, and if every manu-
facturer found it profitable to work out new
ideas of his own and cling to them, if good
and popular, as long as they were profit-
able? In view of the present uncertain
status of design patents, these are sugges-
tions which may furnish food for profitable
thought.

DESIGN PATENTS.

Everywhere about us we find evidences
of a great art awakening. Schools of de-
sign are multiplying, and industrial draw-
ing is gaining a foothold as a part of the
common school course in our principal cities.
Massachusetts has taken the lead, and is
educating designers and artisans whose
work, a few years hence, will make Ameri-
can manufactures as famous for grace and
beauty as they now are for honesty and
utility. If we are to reap the full benefit
of this movement, and encourage those who
have the talent to devote it to the work of
designing, we must see to it that those who
buy this talent shall own its fruits. I know,
gentlemen, that in venturing upon the dis-
cussion of this subject I am treading upon
thin ice. This is not my fault, however,
since no one can differ from me on the point
without quarrelling with his own inter-
ests. I know that, in the excitement and
passion of legal conflicts, men often lose
sight of underlying principles and push for
victory, even though its after consequences
be tenfold more disastrous to them than
those which would have followed defeat.
This is as much to be expected as it is to be
regretted; but when the smoke of
battle shall have blown away and passion
given place to calm reflection, consider
whether every motive of enlightened self-
interest does not prompt you, of all others—
you whose products are saleable in propor-
tion to their attractiveness and utility—to do
what you can, individually and as a na-
tional association, representing an industry
of national importance, to secure such an
interpretation of the law as shall give de-
sign patents a definite, specific, recognized
value. When this is done we shall become
a nation of art workers, and the inspira-
tion of beauty will pervade all departments of
industry and glorify even the common-
place.

Our Commercial Relations with Russia.

The following is from Mr. Wickham
Hoffman, of the Legation at St. Petersburg,
to the Department of State:

While the amount of American products
and manufactures imported into Russia has
very much increased within the last few
years and is constantly increasing, these
articles are no longer brought here in Ameri-
can vessels. The same causes which have
crippled our merchant marine elsewhere—the
introduction of steam and the use of
iron in shipbuilding—have affected our di-
rect trade with Russia.

Other general causes have led to the same
result. The accumulation of capital, the
telegraph and the railway have changed the
course of trade. Very rarely now does the
Russian merchant write or telegraph to New
York for cotton, or petroleum, or dye woods,
or any other American product he may
want. In the free ports of Hamburg and
Luebeck, and the substantially free port of
Liverpool, immense stores of these articles
are kept in depot. The Russian buyer tele-
graphs to one of these free ports, and in a
few days his order is filled. He thus avoids
the danger of a fall in the market, and of
keeping a larger stock on hand than his im-
mediate wants require. He receives besides
very great advantages of credit. These
wealthy depots give him liberal time for
payment, for which in Russia he can readily
pay 8 per cent. A transaction which is to
the advantage of the seller too, who can
readily borrow money in the free ports I
have named at 4 per cent., while the danger
of loss from bad debts is very small; for I
am informed by an American merchant who
has resided here for many years, that one
per cent. per annum is a fair average loss
for bad debts in contracts with Russian mer-
chants. You see, then, that very large sup-
plies of American products may be consumed
in Russia which in all commercial reports
are credited to Germany or to Great Britain.

The question then arises, Is it possible for
us to regain this direct trade? I fear not.
Capital and propinquity must bear their
fruits. If the effort is to be made, it appears
to me it must be by means of small, cheap,
iron steamers, a class of vessels of which
Great Britain seems to have nearly the
monopoly. You meet them in great num-
bers in the Baltic and elsewhere in Euro-
pean waters—steamers burning 6 tons of coal
a day, making 6 miles an hour, the crew
consisting of captain, two mates and 8
seamen, engineer, assistant, and 4 firemen;
the heavy work done by machinery, donkeys
and derricks; iron decks, and patent hatches.
Such vessels cost very little in England, and
are sailed at a very slight expense. Coal is
to be had in bond at prices very little above
Liverpool prices, at almost any port of
Europe. Such vessels could depend upon no
direct return cargo from Russia.

An occasional cargo of hemp from Riga
for our navy, and some few of flax from

Archangel for Boston account, and some
little sheet iron from Cronstadt to New
York, is about all the export from Russia to
the United States. But they could take
grain to Western Europe, and there fill up
with return cargo for New York. These
vessels should be of light draft, that they
may reach St. Petersburg, and not be com-
pelled to lie at Cronstadt, for this makes a
difference of at least 10 days in the receipt
of the cargo, besides saving the expense of
lighterage.

Meantime the depreciation of the Russian
currency is working great injury to our ex-
ports. The rouble, which little more than a
year ago was worth about 65 cents, is to-
day worth 45. The Russian importer is
paid in this currency, and he expects to pay
for his purchases in the same. But the
government collects payment of duties in
gold, and the result is, that for all prac-
tical purposes our products are taxed 50 per
cent. more than they were a year ago. This
is almost prohibitory.

With your permission I shall now give
you a list of American products in demand
in Russia, of which considerable quantities
are now imported, and which, with a favor-
able turn in the finances of the country,
might be imported very extensively. It
would appear as if Russia, with her immense
wheat fields, was the very country for the
use of agricultural implements; but besides
the general causes I have indicated, the pov-
erty of the land owners, the cheapness of
labor, and their prejudice and ignorance,
interfere with their sale, and very few are
at present in demand.

Street cars are very much liked here, and
there is a demand for them, which I think
might readily be increased. They are far
neater and lighter than the other street
cars built generally at Copenhagen. They
are dearer, but experience shows that they
are so much better built, and kept in repair
at so much smaller annual outlay, that there
is a strong disposition to use them. The
expense of sending them here is consid-
erable. They should be shipped only in
summer, for they are carried upon the deck
of the steamer, housed in. The Wilson line
brought some of these cars to Russia last
summer, transshipping them at Hull.

A large trade is done in Lake Superior
copper, especially at the present time, and
at remunerative prices. It is important
both in the shape of brass for cartridges and
in the pig. I think that our Lake Superior
copper must always be in great demand here
for this purpose. We may be said to have
a monopoly of the article, for there is no
other yet discovered that has to such a
degree the qualities of lightness and tough-
ness, so essential for the cartridge shell.
This trade ought to be developed.

A very large amount of cotton is brought
to Russia, both to the ports of the Baltic
and Black Sea. It comes, as I have said,
from the great entrepôts at Hamburg and
elsewhere. But I am told that the Egyptian
is gradually superseding our own. It is
shipped in better order, and its quality is
yearly improving, while ours is deteriorat-
ing. Our cotton goods are not sold here.
They pay duty by weight, and consequently
their very excellence in the quantity of
cotton they contain excludes them.

Locomotives have been built from time to
time in the United States for Russia, for
some years past, and lately 40 were shipped
from Philadelphia. They are so much bet-
ter than those built in Europe, and especially
in Germany, where Russia generally orders
her locomotives, that the government and
the companies are generally ready to pay
something additional in price. American
locomotives do not require one-fourth the
expenditure in annual repairs required by
the German. It of course needs a large
capital to fill a contract for 50 locomotives,
but the government banks here willingly
come to the aid of the contractor for a con-
sideration, and through them the contract
can be carried out. I know of no reason
why we should not supply a large number
of locomotives yearly to the Russian rail-
roads, at an average profit of about \$2000,
say 15 per cent.

Labor-saving machines of all kinds would
sell well could proper measures be adopted
for exhibiting them here and in Moscow.
But for this purpose our machine shops must
combine and send out specimen machines
with engineers to run them. Then hire a
locality and provide power. Establish, in
fact, a sort of permanent exhibition. Sew-
ing machines sold very well here before the
late depreciation in the currency.

Petroleum is one of our principal objects
of commerce with Russia. It is brought in
large quantities to ports of the Baltic and
of the Black Sea, and is shipped from San
Francisco to the Amoor River. In the
meantime, however, the Russians are rapidly
developing their own production of petro-
leum in the Caucasus. They produced last
year 25 per cent. more than the year before.
The great distance, however, of their wells,
and their very imperfect means of commu-
nication, must keep them dependent upon
us for a long time. The cost of barrels, too,
is a serious drawback upon the production.
They actually buy old empty petroleum
barrels at St. Petersburg, and send them
all the way to the Caucasus to be filled and
returned—a journey of six months. They
have not yet learned to refine their oil as
we do, and have not got rid of the disagree-
able odor from which we once suffered.
There is a duty of seven cents a gallon on
petroleum, and, aided by this duty, the
Russian producer is able to fairly compete
with us. They are beginning to prepare
their own lubricating oils too, which but a
short time since came exclusively from the
United States.

Our tools (shovels, spades, axes, hatchets,
&c.) are all very well liked, but are found
to be too dear. The Russians need a rough,
strong article, that can be sold cheaply.
An iron shovel merely tipped with steel and
not polished, is the only American shovel
for which there is any demand. So with
spades and scoops. Screw wrenches have
been very much in demand for the army.

All these articles can be sold to some ex-
tent now. But I repeat that the late war
and the present uncertainty as to the fu-
ture, and the consequent depreciation of the
rouble, have so depressed all trade that
transactions, except on account of the gov-
ernment, are of the most limited character.



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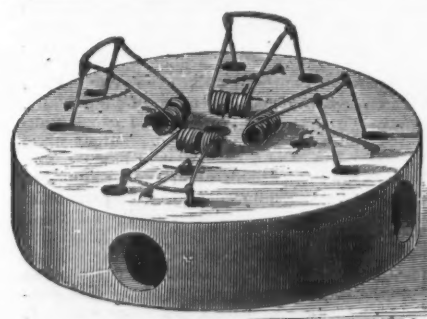
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For Home and Export Trade.

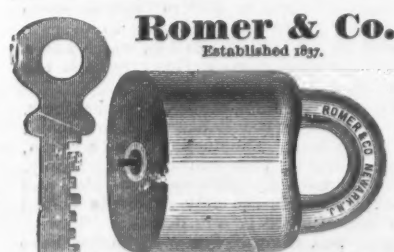
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No.	Size of Rolls.	Price per doz.
10	10X1 1/2	\$60.00
12	10X1 1/2	63.00
15	11X1 1/2	68.00
18	11X1 1/2	71.00

Wood Frame Friction Wringers.

No.	Size of Rolls.	Price per doz.
1 1/2	10X1 1/2	\$51.00
2	10X1 1/2	54.00
3	11X1 1/2	62.00

Self-Adjusting Iron Frame Friction Wringers.

No.	Size of Rolls.	Price per doz.
2 1/2	10X1 1/2	51.00
3	10X1 1/2	54.00
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superior to any other Light for Mining

Purposes. Manufactured by

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CHARLES B. PAUL,
Manufacturer of HAND CUT FILES.

Warranted CAST STEEL. 187 Tenth Street, Williamsburgh, New York. Established 1863.

HELLER & BROS.,

MANUFACTURERS OF CELEBRATED

AMERICAN HORSE RASPS AND FILES,
NEWARK, N. J.



In view of the many so-called improvements and ingenious arrangements of the teeth of Horse Rasps made within the last few years, we take occasion to recommend our own Horse Rasps, made of the best American Steel, all hand cut in the old style by the most skilled mechanics; and we guarantee them to be unequalled in the market, as is best evinced by the unanimous verdict of all the skilled horseshoers who are using them for the last fifteen years all through the United States. For sale by the leading Hardware and Iron Dealers in the United States and Canada.

EXCELSIOR FILE WORKS.



G. F. STOTT, Proprietor,
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JOHN H. SCHAAAL,

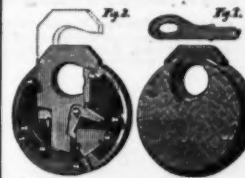
Manufacturer of HAND-CUT FILES Exclusively.
Nos. 1 and 3 Second St., Baltimore, Md.

Warranted superior Cast Steel. Highest Medal received at Maryland Institute Exhibition in 1878. Send for price list. Files recut equal to new.



IRON CLAD PAINT CO.
Cleveland, O.

Order direct from the Iron Clad Paint Co. and get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company. Iron Clad Paint is the most durable, most fire-proof and cheapest paint made. Furnished both dry and ground in oil. Used by nearly all the railroads.



D. K. MILLER LOCK CO.,

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Greatly improved. Prices reduced. As now made it is the best and most economical Pad Lock for all uses extant. Appreciated by all who use them. For simplicity, compactness, durability, convenience and security it has no equal. Springs now made from the celebrated Phosphor Bronze. We make these Locks with Master Keys when so ordered. Largely used by the U. S. Government, Railroads, Corporations, etc., etc. Samples of 2 1/2 in. size sent per mail on receipt of one dollar.

AUSABLE HORSE NAILS
POLISHED OR BLUED.
HAMMERED AND FINISHED



The Ausable Nails

Are Hammered Hot,

And the Finishing and Pointing are Done Cold,

Thus Imitating the Process of Making Nails by Hand

Quality is **Fully Guaranteed.**

For Sale by all Leading Iron and Hardware Houses

ABRAHAM BUSSING, Secretary,

4 Warren Street, New York

A. FIELD & SONS

TAUNTON, MASS.,

MANUFACTURERS OF

AMERICAN AND FRENCH

WIRE NAILS,

TACKS, SHOE NAILS,

And Every Variety of Small Nails.

Offices & Factories at Taunton, Mass.

Warehouse at 78 Chambers St., New York,

where may be found a full assortment of Tacks, Brads, Wire Nails, &c., for the accommodation of the New York Wholesale and Jobbing Trade.

Any variations from the regular size or shape of the above-named goods made from sample to order.

A SILVER MEDAL has been awarded above goods at the Paris Exposition, being the only medal awarded any American manufacturer of Tacks and Wire Nails.

Hoisting Machinery

MANUFACTURED BY

CRANE BROTHERS MFG. CO.,

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The Upright Family Scale

PATENTED.



With Tin Dish.

Weighing 12 lbs.

by 1/2 lb.

List \$16 per

Dozen.

Liberal Discount

to the Trade.

This Scale has an

attachment for

Tare. Just the

thing for family use.

Manufactured by

JOHN CHATILLON & SONS,

89, 91 and 93 Cliff St., NEW YORK.

PRIZE MEDALLISTS:

London, 1862; Oporto, 1865; Dublin, 1865; Paris, 1867; Moscow, 1872; Vienna, 1873, and Philadelphia, 1876.

CLARK & CO.,

Original Inventors and Sole Patentees of

Noiseless Self-Coiling Revolving

STEEL SHUTTERS,

FIRE AND BURGLAR PROOF.

ALSO IMPROVED

Rolling Wood Shutters

Of various kinds. Endorsed by the Leading Architects of the world.

Send for Catalogue.

Office and Manufactory,

162 & 164 West 27th St., N. Y.

PHILADELPHIA NOVELTY MFG. CO.,

821 Cherry Street, PHILADELPHIA, Pa.

Inventors, Proprietors and Sole Mfrs. of the

AMERICAN MINING KNIFE,



WITH

ONE, TWO

and

Three Blades.

Patent Feb. 11, 1879.

Automatic Fountain Penholder, Novelty Pen Clip, Duplex Can Opener, Self Locking Door Indicator, and other new and standard patented novelties for the trade only. Illustrated catalogue and price list upon application.

PATENT MINERAL WOOL,

Entirely fire-proof, undecaying and the best non-conductor of Heat, Cold and Sound. Used extensively for lining steam pipes and boilers, underground and open-air pipes, water tanks, refrigerators, cold storage houses, roofs and walls of dwellings, drying kilns, deadening floors of railway passenger cars, &c.

A. D. ELSBES,

26 1/2 Broadway, New York.

Address P. O. Box 446.

ANSONIA CORRUGATED STOVE PLATFORM

Manufactured by the

Ansonia Brass & Copper Co.

Office, 19 & 21 Cliff Street,

NEW YORK.



Cut Showing Round Platform.

Section Showing Edge.

ANSONIA BRASS SPRING WIRE.



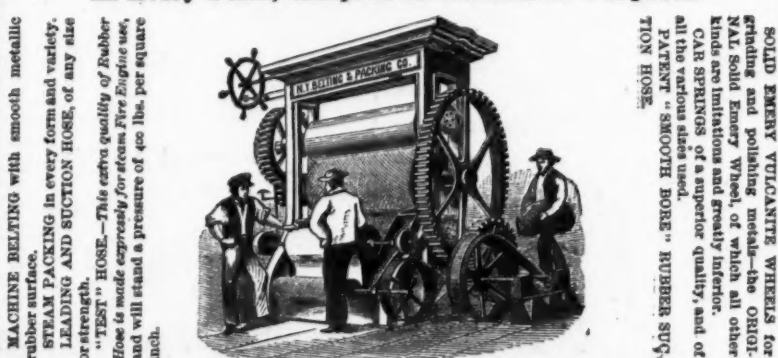
The Ansonia Brass Spring Wire is made to combine the qualities of uniformity of temper, great power of resistance and recovery, toughness and accuracy of gauge. Each bundle of wire, before it leaves the works, is subjected to test in a machine which records the deflection and molecular displacement under transverse stress and torsion, and is especially adapted to making spiral springs for moving and reaping machines, harvesters and for all purposes for which the highest grade of spring wire is required.

NEW YORK BELTING AND PACKING COMPANY.

The oldest and largest manufacturers in the United States of

Vulcanized Rubber Fabrics

In Every Form, Adapted to Mechanical Purposes.



CABLE ANTISEPTIC COTTON HOSE. Patented July 8, 1875. This is a rubber-lined, extra heavy Cotton Hose, woven seamless in a peculiar manner, to insure compactness and durability. The 3-ply weighs 6 lbs. to the section, and has been tested to 200 lbs. It is the lightest and most durable seamless Cotton Hose in the market. For use on Hand or Steam Fire Engines.

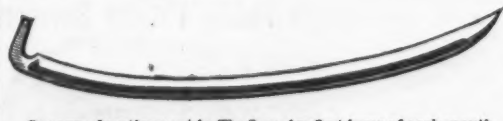
ANTISEPTIC LINEN AND RUBBER-LINED LINEN HOSE. A cheap and durable article for mining, mill and factory purposes. Will stand a pressure of 30 lbs. per square inch.

CAUTION.—Our name is stamped in full on all our best Standard Belting, Packing and Hose. Buy that only. The best at the cheapest.

WAREHOUSE, 37 and 38 Park Row, New York.

JOHN H. CHEEVER, Treasurer.

Price lists and further information may be obtained by mail or otherwise on application.



Beardsley Scythe Co.,

Manufacturers of

GRASS, GRAIN & BUSH SCYTHES,

Hay Knives & Corn Knives.

West Winsted, Conn.

See our advertisement in The Iron Age first issue of each month.

GRAHAM & HAINES,

P. O. Box 1040. 113 Chambers and 95 Reade Streets, New York.

HARDWARE MANUFACTURERS' AGENTS, as follows:

Lawrence Curry Comb Co.,
Curry Combs.
Howard Bros. & Co.,
Cotton, Wool and Curry Cards.
Thompson, Derby & Co.,
Scythe Smiths.
Chicago Fork Mills,
Steel Forks, Rakes, Hoes, &c.
H. Knickerbocker,
Scythes, Axes and Tools.
H. W. Kipp, Nail Hammers.
Kleiman, Park & Co., Vices,
Picks, Mattocks, Grub Hoes, &c.
Jacobus & Nischel Mfg. Co.,
Locks, &c.
Sandusky Tool Co.,
Planers and Plane Irons.
Geo. M. Eddy & Co.,
Measuring Tapes.

Wheeling Hinge Co.,
Rings and Wrought Hinges.
Northwestern Horse Nail Co.,
Horse Nails.
A. G. Coes & Co.,
Cox's Genuine Screw Wrenches.
F. K. Silby, Emery Cloth.
Holroyd & Co., Stocks & Dies.
Sedgwick Mfg. Co.,
Butter and Flour Trainers, etc.
Ripley Mfg. Co., Mouse Traps.
Sims' Loring,
Flymouth Tack & Rivet Works.
Carr, Ormsley & Declin,
Miscellaneous Hardware & Cast
Butts.
J. Mallinson,
Cast Steel Shears and Scissors.
Ketchum's Pat. Metallic Sieves.

W. D. Turner & Co.,
Geneva Hand Saws.
D. B. Niles & Son,
Hand and Meigh Belts.
C. S. Osborne & Co., Cam-
pases, Calipers, Dividers, &c.
C. W. Maguire, Brushes.
Clark Bros. & Co.,
Carriage Bolts, &c.
Lowrey & Tucker, the Gum
and Knox Fluting Machine.
T. D. Barclay,
"Dodge's" Kentucky Cow Bells.
Lane Bros., Swift's and Gro-
cers' Coffee Mills and Measuring
Faucets, &c.
T. C. Richards Hardware Co.,
Bright Wire Goods, Picture Nails,
&c.

Scientific and Technical Notes.

In a recent number of *Dingler's Poly-
Journal* we find a full description of
MARKE'S HOT WATER INJECTOR FOR LOCO-
MOTIVES.

exhibited at the Paris Exhibition, in con-
nection with Kirchweyer's apparatus for
heating the feed water by a portion of the
exhaust steam. The latter consists of a bi-
furcated exhaust pipe, so arranged that a
portion of the exhaust steam is directed
from the blast nozzle and conducted to the
tender. Now, it has been impossible hitherto
to take advantage of the saving effected by
heating the feed water, because the ordinary
injectors will not work unless the feed
water is at such a temperature that it does
not get raised by the condensation of the
steam used in working the apparatus to a
temperature more than 212 degrees, or to
the temperature at which ebullition takes
place under ordinary atmospheric pressure.
MARKE effects the working of the injector
under pressure, the suction pipe of the in-
jector communicating with a closed cham-
ber on the tender, and the overflow pipe
being fitted with a spring loaded valve,
the load on this valve being about 30 lbs.
per square inch. This combination of ap-
paratus has been at work on the Alta Italia
Railroad for more than a year, and the record
of 11 months showed a saving of about
14 per cent., due to the use of hot feed
water.

From a long series of experiments on
ELECTRO-CHEMICAL ACTION UNDER PRESSURE,
varying from 100, 200 to 300 atmospheres
and upward, M. Bouvet arrives at the fol-
lowing among other facts: The decomposition
of water by a current is independent of
pressure. The quantity of electricity neces-
sary to decompose a given weight of water
is sensibly the same, whatever the pressure.
Oxygen and hydrogen, whatever the pres-
sure, are liberated with equal facility.
Whether they are produced in one test tube
or in two, there are no secondary phenomena
causing decomposition, even partial, as has
been believed hitherto. When united in one
test tube, even at a considerable pressure,
and though forming a detonant mixture,
they do not offer any danger in handling.

We are indebted to Mr. H. Simon for a
pamphlet descriptive ofHILF'S SYSTEM OF WROUGHT IRON PERMA-
NENT WAY FOR RAILROADS.

Though not directly applicable to the pecu-
liar circumstances in this country, the mat-
ter possesses importance as affecting the
iron and steel industries of Great Britain
and the Continent. Hilf's improved system
of permanent way consists in the employment
of longitudinal sleepers of rolled iron, to
which the rails are connected by screw
bolts, in combination, however, with cross
sleepers also composed of rolled iron. The
cross sleepers are arranged either under the
joints of the longitudinal sleepers, in which
case the fish-joint of the rails will be over
the cross sleeper, or one cross sleeper may
be employed at each end of each pair of
longitudinal sleepers, leaving the necessary
space for packing with ballast between the
two adjacent cross sleepers. In this latter
case the joints will be what is generally
called suspended joints, same as now mostly
employed in ordinary permanent way. It
was first introduced on the line between
Ems and Wiesbaden, Germany, and has
since made rapid progress in Prussia, Aus-
tria, Bavaria, Alsace, Lorraine and Belgium.

A correspondent of the *Railroad Gazette*
announces that by the use of

PARAFFINE AS A LUBRICANT,

the Erie Railway has considerably reduced
its oiling expenses on passenger-car journals,
and has reduced the number of hot journals
from 535 to 382. It is now used during the
winter months without the addition of any
other oil, but it is found that in summer it
becomes so limpid that it is hard to keep it
in the axle boxes. During the summer
months it is, therefore, mixed with some
other lubricant to give it more "body."

The *English Mechanic* describes a simple
implement for

POLISHING METALS WITH EMERY.

It consists of two longitudinal bars of wood,
metal, or any other suitable material, hinged
at one of the longitudinal edges. The sur-
face of the bars, the section of which is
done to correspond with the work to be
done, is covered with a sheet of cloth, paper
or other flexible material, coated with
emery. The cloth is fastened and stretched
tightly by being pierced by studs attached to
the flat surface of contact.

A curious instance of the

MINUTE CAUSES WHICH AFFECT EXPLOSIONS

was given recently by St. Claire Deville, as
observed by Prof. Abel. About 2 grain of
chloride of nitrogen is placed in a watch
glass and exploded with a piece of phos-
phorus; the noise is tremendous, but the
explosion has little or no shattering effect.
Now repeat the same experiment, after hav-
ing breathed on the chloride so as to deposit
a thin envelope of moisture (which cannot
be more than a thousandth of a millimeter
thick). In this case the explosion is less
noisy, but the effects are quite different.
Not only is the glass pulverized, but the
table supporting it is perforated.

A German firm is manufacturing

WOVEN STEEL WIRE BELTING,

which they claim to transmit power well, to
operate without lengthening, and to run
smoothly because there is no overlapping at
any place. The spirals of wire are woven
across the belting, so that three, four or
more spirals form one link. The space be-
tween two links is, besides, filled up with a
cross-piece, so that the closely woven net-
ting of spiral wire forms a band of great
strength and flexibility. It is faced and
lined with rubber or leather.

In the *Annalen der Physik*, Th. von Jolly

writes on the use of the

BALANCE FOR THE DETERMINATION OF THE

SPECIFIC GRAVITY OF THE EARTH.

According to the law of gravitation, two
equal weights, if weighed on a balance, one

of the pans of which is at a greater dis-
tance from the center of the earth, must
show a corresponding difference. Mr. von
Jolly has actually found, with a difference
of height of pans of 17 feet, and a weight of
1 kilogram, a difference of weight of 1.5
milligram. According to the law of gravi-
tation, the difference ought to have been
1.652 milligram. If a balance were
mounted in the same way, and a leaden
ball placed near the lower pan, a corre-
sponding increase of the weight on the pan
would be produced. Based upon the figure
given as the average density of the earth,
it would be possible to ascertain the diam-
eter of a sphere of lead which would cause
an increase of 1 milligram for one kilo-
gram. This could be again used for ascer-
taining the average density of the earth.

A novel construction has been recently
described in *Engineering* as having been em-
ployed in the Dysdale Viaduct, on the rail-
road from Christiania and Fredrikshald, carry-
ing a single rail over the Dyse brook.
These

ROCKING PIERS FOR VIADUCTS

are intended to protect the structure from
the effects of expansion and contraction, due
to alterations of temperature. The piers
which support the superstructure are of
wrought iron with lattice-work web. In the
longitudinal direction of the viaduct, which
is some 603 feet in length, there is only a
single column between each span, possessing
no stability in itself, and the upper end is
allowed to move along with the superstruc-
ture when the latter expands and contracts.
The lower end of each pier rests on a hinged
shoe, so that breaking strains are avoided,
and the load is always rendered central to
the pier columns. The movement of iron
work in a longitudinal direction is trans-
ferred to the one abutment on which are the
necessary bed plates, provided with rollers;
on the other the superstructure is kept in
place by a fixed shoe. With this arrange-
ment, it is stated that no special expansion
joint in the rails is necessary, as the sleepers
and platforms are quite independent of the
expansion and contraction of the ironwork.

A new regulator for electric light pro-
duced by the burning of carbon points, is the

SIEMENS & HALSKE LAMP,

which may be called a modification of the
Serrin type. The two carbons, both up-
right, are hinged at their lower ends so that
they fall toward one another. The neces-
sary distance between their upper extremi-
ties is maintained by a rod of some refrac-
tory substance interposed between them.
This rod is moved in a vertical direction by
a lever arm, which, in its turn, is controlled
by an electro-magnet. The passage of the
current through the electro-magnet and the
carbons tends to thrust the refractory rod
upward and to separate the carbons. If,
however, the current becomes too weak, the
rod drops and the carbons approach one an-
other correspondingly.

A very interesting historical fact has been
brought out, in a paper read at the last meet-
ing of the English Institution of Mechanical
Engineers, by Mr. H. A. Fletcher, on the

HESLOP ENGINE,

a remarkable and ingenious form of steam
engine, invented by Adam Heslop, and
patented by him in 1790. This engine, which
contained the germ of the compound system,
was little, if at all, known outside of Cum-
berland. Out of 15 engines, of which there
are tolerably full records, only one specimen
now remains, and that is stopped and has been
sent to South Kensington. The Heslop en-
gine has two open-topped cylinders, called
respectively the hot and cold cylinder, one
on each side of the main center of the
beam; both are single acting, their pistons
acting in the same direction. The steam,
on being admitted into the first, or ho-
cylinder, helps to raise the piston by its
pressure underneath; the return stroke is
then made by the weight of the
pump-rods, &c., in the pit, suspended
by a chain working over an arched
beam-head. During the down stroke of
the pump-rods, the reduction valve being
opened, the steam passes from the hot cylin-
der to the second or cold cylinder by means
of a connecting pipe constantly immersed
in cold water, which produces sufficient con-
densation to "kill" or reduce it to atmos-
pheric pressure as it enters and fills the cold
cylinder. The cold piston having arrived
at the top of its stroke and its cylinder being
thus filled with steam, the injection valve is
opened, admitting a jet of water beneath
the piston, thus bringing a vacuum into
play. In the case of rotative engines, the
return stroke was made by the weight of
the connecting-rod, crank, and a heavy pair
of links attaching the hot piston to the beam,
assisted by the momentum of the fly-wheel.
The two pistons are heavily weighted in
equilibrium, probably to keep the chains
taut, and the action of the steam in the hot
cylinder simply takes off the weight of the
hot piston and allows that of the cold piston
to come into play.

A German, Mr. Pintsch, has invented a
system of illuminating railway cars, which
has recently been applied with much success
in England in

ILLUMINATED BUOYS.

The buoy is made the recipient for a large
body of compressed, rich and heavy gas,
produced by distilling shale or any fatty
material. An ingenious regulator provides
for the regular supply of the lamp, which
will burn three months, night and day, with
only one filling, the light being visible at a
distance of about four miles. There is,
however, in existence an electric lighting
apparatus which might be employed, so that
the light could be extinguished at sunrise
and restored at night, giving, of course, a
much longer duration to the working of the
buoy.

Some time ago we drew the attention of

our readers to the researches of Prof. J.

Delboeuf and D. Spring on

NATURAL AND ARTIFICIAL COLOR BLINDNESS.

They found that by looking through a layer

of fuchsine, persons afflicted with color

blindness are relieved of their infirmity. A

practical application of this discovery has

been made by M. Javal; by interposing be-
tween two glasses a thin layer of gelatine
previously tinted with fuchsine,

Cutlery.

FRIEDMANN & LAUTERJUNG,
Manufacturers of
PEN AND POCKET CUTLERY,
Solid Steel Scissors, Shears, Razors, &c.
Sole proprietors of the renowned full concave patent
"ELECTRIC RAZORS,"
And the celebrated "ELECTRIC SHEARS." Nickel Plated
Bows.
Agents for the **BENGAL RAZORS.**
AMERICAN TABLE CUTLERY, BUTCHER KNIVES, &c.
91 Chambers and 75 Reade Sts., N. Y. 423 N. Fifth St., ST. LOUIS, MO.
MERIDEN CUTLERY COMPANY.
THE "PATENT IVORY" HANDLE TABLE KNIFE.

THE LAMSON & GOODNOW MFG. CO. N.Y.
88 CHAMBERS ST.
AMERICAN TABLE CUTLERY &c.

The oldest manufacturers of Table Cutlery in America. Exclusive makers of the CELLULOID HANDLE for Table Cutlery. A most beautiful and perfect substitute for Ivory. Also makers of all kinds of TABLE, BUTCHER and HUNTING KNIVES. Illustrated catalogues with prices sent to the trade on application. No. 49 Chambers Street, New York.

AARON BURKINSHAW,
Manufacturer of Pen and Pocket Cutlery, Pepperell, Mass.
My Blades are forged by hand from the best Cast Steel, and warrant-
ed. To me was awarded the Gold Medal of the Conn. State Agricultural Society.
Office in New York with E. P. Whipple, 100 Chambers St.

NAUGATUCK CUTLERY CO.,
Manufacturers of FINE PEN & POCKET CUTLERY.
FULLER BROS., Sole Agents, 89 Chambers and 71 Reade Sts., N. Y.

HALL, ELTON & CO.,
Electro Plated Ware, German Silver and Britannia Spoons.

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(Patented.)
Factories, Wallingford, Conn. Salesroom, 75 Chambers Street, New York.
MANUFACTURERS' SUPPLIES.
The Best and Lowest Price.

H. A. ROGERS, 19 John Street, New York.
A few doors from Broadway.
Steam Gauges, Belting, Chucks, Drills, Packing, Governors, Jacks, Oil Cups.
STEAM PUMPS for Pumping, Fire Purposes and Boiler Feeding. Also VALVES, PIPING and VISES.
The Largest Stock in the City.

BUCK BROTHERS, Millbury, Mass.
The most complete assortment in the U. S. of
Shank, Socket Firmer and Socket Framing Chisels,
PLANE IRONS.
Gauges of all lengths and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns
Chisel Handles of all kinds. Carving Tools. Also small Boxes of tools of best quality.

THE Simplest Strongest and Cheapest OF PATENT Burglar-Proof SASH LOCKS.
No Spring.
Send for illustrated catalogue to
PAYSON & CO.,
MANUFACTURERS OF
Builders' Hardware,
1319 to 1325 West Jackson St.,
CHICAGO.
Nos. 0 and 22, Perfect Sash Locks.

MARTIN'S ENGLISH HORSE CLIPPERS.
J. J. Shannon,
1707 Market St.,
PHILADELPHIA.
Recommended as the best hand Clipper made.
\$3.50 EACH.
Extra pieces for sale.
Send for circular.

Cutlery.

McCoy & Co.,
134 & 136 Duane Street, New York,
SOLE WHOLESALE AGENTS
CLARK'S PATENT HORSE CLIPPER
Five styles. Fully described by our circular and price list, which we will send on application.
The genuine are stamped on both the wooden and metal parts, as shown in the illustration, as a protection against inferior imitations.
All repairs executed with care and dispatch.

HERMANN BOKER & CO.,
101 & 103 Duane Street, New York,
SOLE AGENTS FOR THE
GARDNER PATENT POCKET KNIVES
The assortment of Gardner's Celebrated Barlow Knives has been increased, and they are now furnished with Rubber, Bone, Stag and Wrought Iron Handles.
All of Gardner's Patent Knives are fully warranted.

STANLEY RULE AND LEVEL CO.,
MANUFACTURERS OF
Improved Carpenters' Tools.
No. 113, Improved Adjustable Circular Plane - \$4.00

Cutlery.

JOSEPH S. FISHER,
No. 411 Commerce St., PHILADELPHIA
AGENT FOR
George Wostenholm & Son,
Washington Works, SHEFFIELD,
Celebrated I-XL Cutlery, Razors, &c.
AGENT FOR
WALTER SPENCER & CO.,
Steel and File Manufacturers,
Rotherham, ENGLAND.
Corporate Mark.
NO SPENCER ROTHERHAM
Granted 1777.

A. G. COES & CO.
Established in 1839.
WORCESTER, MASS.,
Successors to
L. & A. G. Coes,
Manufacturers of
THE GENUINE COES Screw Wrenches.
PATENTED,
May 9, 1871.
December 26, 1871.
December 28, 1875.
August 1, 1876.

The back strain when the wrench is used is borne by the bar—not by the handle.
The strongest Wrench made, and the only successful Re-enforced Bar.
None genuine unless stamped
A. G. COES & CO.,
Our Agents, GRAHAM & HAINES, 113 Chambers St., New York, carry a full line of our goods, and will be pleased to serve you at factory prices.

Isaac Greaves' Best Cast Steel SHEEP SHEARS.
Equal to any in quality and finish, and lower in price. Same numbers, styles and list as Walker's.

ALFRED FIELD & CO.,
93 Chambers Street,
Sole Agents. NEW YORK.
P. O. Box 362.
ESTABLISHED 1836.

Alfred Field & Co.,
COMMISSION MERCHANTS,
New York, Birmingham, Sheffield, Liverpool.
Guns and Pocket Cutlery, SPECIALTIES.

Headquarters for
ELEY'S BROS.' GOODS, WRIGHT'S ANVILS,
WILSON'S BUTCHER KNIVES, &c.
WOSTENHOLM'S POCKET CUTLERY AND RAZORS,
BUTCHER'S FILES, TOOLS AND RAZORS,
STUBS' FILES, HISCOX FILES,
GREAVES' SHEEP SHEARS,
CHESTERMAN'S TAPES,
GERMAN COIL AND HALTERS and other CHAINS,
BRADEN'S TROWELS AND HOES,
CANASTOTA KNIFE CO.'S POCKET KNIVES.
Etc., Etc., Etc., Etc.
All sorts of Hardware and Merchandise for import and export purchased on commission.

R. COOK & SONS,
Manufacturers of
Carriage & Wagon AXLES,
WINSTED, CONN.
ESTABLISHED 1839.

W. & J. TIEBOUT,
Manufacturers of
Brass, Galvanized & Ship Chandlery Hardware,
No. 290 Pearl Street, New York

J. R. SPENCER & SON,
Albion Steel Works, Sheffield,
MANUFACTURERS OF
FILES AND STEEL,
Table Knives, Razors, Shovels, &c., &c., of every description.
CORPORATE MARK.

SPENCER SHEFFIELD
Granted 1749.

Joseph Rodgers & Sons' CELEBRATED CUTLERY,
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P. & W. CLATWORTHY, Agents.
The demand for Joseph Rodgers & Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam power.
To distinguish Articles of Joseph Rodgers & Sons' Manufacture, please to see that they bear their Corporate Mark.

Young's Patent Folding Scissors.
PAT. MAY 28, 72.
Having largely increased our facilities for the manufacture of these very popular goods, we offer them to the trade at a large reduction from our former prices. The list price of the large size is now \$2.00 per dozen, formerly \$2.50, and the small size, \$1.00, formerly \$1.25. The material used in the manufacture of Young's Patent Folding Scissors is the very best. All are nickel-plated and furnished with a neat morocco case.
MARX BROS., Proprietors,
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SYRACUSE CUTLERY COMPANY,
Manufacturers of
Pen and Pocket Knives,
Warranted made from
S. & C. WARDLAW'S EXTRA CAST STEEL.
Near 71 Clinton St., SYRACUSE, N. Y.

ALFRED H. HILDICK,
12 Warren St., N. Y.,
Importer of CHAINS, ANVILS, VISES, &c.
Agency of
HILL BROTHERS & CO., WALSALL, ENGLAND
GENERAL HARDWARE MERCHANTS,
And of
BALL'S PAT. SOLID STEEL SHEEP SHEARS.
These shears are unsurpassed for cheapness, durability and utility. They are made of one solid piece of steel from point to point, and cannot be broken in use either in the bow or at the junction of the shank and blade. Samples can be seen at above address, or sample lots furnished.

"DRAW CUT" BUTCHERS' MACHINES.
Choppers, Hand and Power.
Stuffers,
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Warranted thoroughly made and the BEST IN USE.
MURRAY IRON WORKS,
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B. W. PAYNE & SONS,
Coring N. Y.,
Established in 1840.
Eureka Safety Power.
h.p. cyl. ht. space. wt. price.
2 3/4 4 1/2 10 40x25 500 \$150
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Also, Spark Arresting Portables and Stationary Engines for Plantations. Send for Circulars.

Phosphor-Bronze.
Cylinders, Hardware, Bearings, Valves, Bolts, Steam Whistles, Hammered Piston Rods, Wire, Rods, Sheets, Bolts, Tubes, Plates, etc. Apply to the PHOSPHOR-BRONZE SHEETING CO., Limited, 222 Washington Ave., Philadelphia, Pa., Sole Manufacturers in U. S.

CHAS. E. LITTLE, 59 Fulton St., N. Y.
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Solid Cast Steel Augers & Reamers
For Boring PUMP LOGS. All sizes in stock. Socket Shafts, Ring Handles, and Connecting Rods for the above in order. Also Pumping Tools for joining log ends. Coppers' and Slaters' Tools. Tool Chests. Tools for all trades a specialty.

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WELSH & LEA. NORWAY IRON CARRIAGE & TIRE BOLTS, AXLE CLIPS, &c.

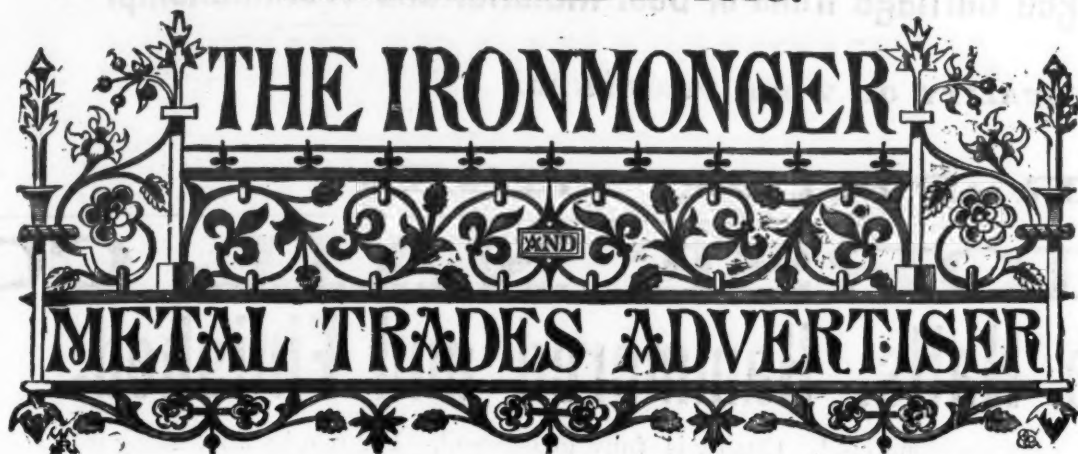
Highest and only Awards and Medals, Philadelphia, 1876, and Paris, 1878.

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PHILADELPHIA, U. S. A.

ESTABLISHED IN 1859.



PUBLISHED EVERY SATURDAY.

THE OLDEST AND CHIEF REPRESENTATIVE OF THE IRON, HARDWARE AND METAL TRADES.

OFFICE: 44a CANNON STREET, LONDON, E. C.

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SPECIAL FEATURES.

Notes of Novelties.—This is a department of the journal always watched with interest by the trade, as it contains an account, from week to week, of the novelties which manufacturers and inventors are introducing to the notice of the trade. These articles are freely illustrated.

Special Correspondents.—The *Ironmonger* has a deserved reputation for its special correspondence from all the principal Continental, British and manufacturing centers. The writers are gentlemen holding important positions in the districts with which they are connected, and possess facilities for acquiring information specially suited for the columns of the *Ironmonger*. The *Week*, *Legal Notes*, *Trade Notes*, *Bankruptcies*, *Foreign Notes*, *Colonial Settings*, *Merchants' Circulars*, *Imports and Exports*, &c., are each departments of the journal, containing a digest of all matters of direct interest to the Iron, Hardware and Metal Trades. In addition to the above, there is a carefully classified list of Patents, together with Editorial Notes, French, Belgian and other Special Correspondence.

SUBSCRIPTIONS

to the *Ironmonger* and *Metal Trades' Advertiser*, with which is sent every fourth week the Foreign Supplement (see below), may commence from any date, but are not received for less than a year complete. The rate is \$5 per annum, inclusive of postage to any part of the world outside Great Britain. To every subscriber is presented, free, in the course of his year, a handsome and useful *Ironmongers' Diary and Text Book*, a work sold to non-subscribers at 75 cents.

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In April and October of each year there is published a Special Issue, the circulation of which is not less than Twelve Thousand (12,000) copies. 11

THE IRONMONGERS' DIARY AND TEXT BOOK.

This is an annual, presented free to every subscriber to the *IRONMONGER* and *METAL TRADES' ADVERTISER*. It contains a large number of ruled skeleton pages for diary and other entries, and in addition much useful reference information, varied from year to year. It is handsomely bound in cloth, gilt; and as copies are used in thousands of establishments for a whole year, it is obviously a medium of exceptional value for advertisements. Sold to non-subscribers at 75 cents.

THE FOREIGN SUPPLEMENT

Is published every fourth week in connection with the extensive and world-wide circulation of the *Ironmonger* itself. The dates of its publication in 1879 will be as follows: JANUARY 11, FEBRUARY 8, MARCH 8, APRIL 5, MAY 3 and 31, JUNE 28, JULY 26, AUGUST 23, SEPTEMBER 20, OCTOBER 18, NOVEMBER 15, DECEMBER 13.

This Supplement is published in

FIVE LEADING COMMERCIAL LANGUAGES

of the world, including English, and is sent to all the countries where they are spoken, thus placing the contents of the *Ironmonger* not only within reach but in the native language of eighty millions of German, forty-two millions of French, twenty-eight millions of Italian, and fifty-one millions of Spanish speaking people; or, in all, over two hundred millions of inhabitants in the principal nations where the best purchasers of manufactured goods are to be found.

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Advertisers will do well to use illustrations freely. Where economy of space is an object, a left page illustrated and described, in one language, can be suitably described in four or more languages on the opposite or right page without illustrating.

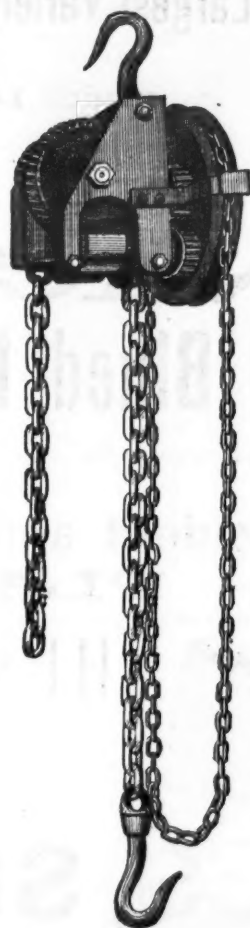
THE WHOLE FOREIGN HARDWARE TRADE,

so far as our experience of twenty years is concerned, will be covered by THE FOREIGN SUPPLEMENT at least twice a year. Thus a Price List or Advertisement inserted in the *Ironmonger* and FOREIGN SUPPLEMENT is a strikingly powerful and most efficient way of publicity, not to be compared with any of the other ordinary channels of communication.

New Screw Hoisting Tackle.

We show in the accompanying cut a new hoisting apparatus recently patented by Alfred Box, and now manufactured by Alfred Box & Co. at the Northern Liberty Machine Works, Nos. 312 and 314 Green street, Philadelphia.

The results desired in the construction of this hoist were durability of the working parts and quickness in handling loads. To accomplish this end, the sheave of the lifting chain is a double worm wheel, driven at the lower periphery by two worms, the chain passing over the sheave between them. Each of these worms is sufficiently speeded by a gear at the extremity of its shaft, driven by the larger gear cast on the hand-chain wheel, to make a man power at that point equivalent to a ton or a ton and a half load lifted. It is the opinion of the patentee that where great weights are to be raised, it is more profitable to use another man for the time being and hoist quickly, than to have a slow-moving machine with more power. In a great majority of cases where this hoist would be employed, the power of one man would be amply sufficient to move the load with ease and rapidity. As the load is distributed on two screws, each does but one-half the work, consequently the pressure against the worm wheel is proportionately



divided. The worms and thrusts present twice the bearing surface, hence the friction is not concentrated at any one point, and the strength and durability of the machine are thereby greatly increased. The chains are gauged accurately to the teeth both of the lifting sheave and hand-chain wheel, to prevent hitching and jamming when in motion. The chains are also guided through eyelet holes to their proper positions on the wheels, so that whether the hoist is lifting at an angle or is thrown carelessly on the floor, the chain cannot get snarled or come loose from its sheave. The use of a large lifting chain gives a strong tooth, and its slow motion over the lifting sheave reduces the wear. It is also claimed that a large chain is stronger than a combined lot of small chains of the same section.

The machine is very short and can readily be used for low lifts. It may also be suspended from wheels on a rail or beam, and used as a traversing hoist. There are no journals to twist off, and the working parts being exposed the condition of the machine can always be seen. It will sustain the load at any desired point, but will lower rapidly on being started. The construction of the hoist is simple throughout, and adapted to the attainment of a smooth running and efficient tool. All the lifting strains are supported by wrought iron pins and straps; the bearings of the worm shafts are chilled, and the worms themselves constantly lubricated by running in a casing packed with oiled waste.

Deposit of Cadmia in a Coke Furnace.

Before the Chattanooga meeting of the American Institute of Mining Engineers, Mr. H. Firmstone, of Longdale, Allegheny County, Va., read a paper on a deposit of cadmia, or impure oxide of zinc, in a coke furnace. Such deposits, generally known as "sulphur rings," are of common occurrence in the upper parts of blast furnaces using ores containing zinc, and were very common in the charcoal furnaces of Virginia working the brown hematite ores found near the Cadent black slate. These charcoal furnaces having, as was customary, very small tunnel heads, frequently became much obstructed by the zinc deposits, and it was a common thing for them to be blown down for the purpose of "burning out the sulphur ring," it being supposed that the heat at the top while blowing down tended to remove the obstruction. How far this may have been the case does not appear, but from the persistent manner in which these deposits remain during blowing out, in the top of a coke furnace with which Mr. Firmstone is familiar, he should judge that but little good was done by the operation.

The furnace in which the deposit was studied is 60 feet high and 11 feet in diam-

eter at the largest place, which is about midway of the height; the tunnel head is 8 feet in diameter, and the furnace is filled by a modification of Coign's charger (or double bell), as described by Mr. F. Firmstone, the gas being taken off by a central pipe. The hearth is 6 feet diameter, and has three tuyeres. About 3700 cubic feet of blast per minute is supplied to the furnace, at 3½ pounds pressure per square inch, the temperature of the blast being a full lead heat, rarely melting zinc. The coke used is New River coke, from West Virginia; the iron ore is brown hematite, obtained near the furnace in Allegheny County, Virginia, and contains about 46 per cent. of iron. The limestone is a pure carbonate of lime, supposed to correspond to the pre-meridian limestone of Rogers' Pennsylvania Survey. Twenty hundredweight and three quarters of coke are consumed in making a ton of gray forge pig iron, the furnace producing about 185 tons of iron per week. The cubic contents of this furnace is about 39,000 cubic feet. Several analyses of average samples of the iron ore have been made, but in no case was any zinc found. The same is true of the coke and limestone. The zinc undoubtedly comes from the iron ore, but must have been missed each time in sampling.

The deposit of cadmia was formed during a 14 months' blast, the furnace having been blown in September, 1876, and blown out November, 1877. An examination of the horizontal section of the cadmia, shows it to have four prominent points directly over the tuyeres and midway between the points at which the stock was dumped in, while directly under these last-named points there is but little deposit. In either case it seems most probable that the position of the tuyeres had nothing to do with the thing, but most likely it has been the distribution of the materials. The center of the ring was about 7 feet from the top of the furnace, being in its largest portion about 3 feet thick.

The furnace was again blown in, running for a little less than 10 months, and after blowing out again showed a deposit of cadmia much larger than the first, and exhibiting the same characteristics in its formation, although the law was not so markedly expressed in this case. This, however, would appear to be due to the much larger size of the deposit, the tunnel head of the furnace being much more nearly closed than in the first case. Considerably more ore was used during the 10 months' blast than during the previous 14 months' blast, the output of the furnace having been greatly increased, and hence the larger size of the deposit in a shorter time.

The first deposit, on being removed from the furnace, was found to weigh 4 tons 6 cwt.; the second, 12 tons 4 cwt. Both deposits were sold to a zinc company, I presume for conversion into spelter. An analysis of a piece from one of these deposits resulted as follows (by Dr. T. M. Drown):

Silica.....	9.94	Lime.....	1.22
Iron, mostly metal.....	93.59	Oxide of zinc.....	93.59
Alumina.....	2.44	Carbon, by loss.....	0.61
Oxide of lead.....	0.99		
Total.....	100.00		

It would seem that such deposits as this ought to greatly interfere with the regular descent of the charges, and thereby with the furnace-carrying burden; but such was not the case here, the furnace having, during both blasts, carried a good burden up to the last, and having worked quite regularly, although in the last case the burden was not quite so heavy nor the work quite so regular as earlier in the blast. It will, no doubt, be necessary, in the case of longer blasts being made at this furnace, to blow down occasionally and cut out the deposit (a job that will not be easily accomplished, as the substance is very hard), and take it out of the top of the furnace, not allowing it to descend into the hearth.

The Landore Steel Company.

This company, which established works at Landore to carry out Dr. Siemens' direct process for the manufacture of steel from pig and ore, seems to have come to an untimely end. The *Sheffield Independent* of a recent date says:

Yesterday, in the High Court of Justice, Chancery Division, before Vice-Chancellor Malins, Mr. Glassey, Q. C., appeared in support of a petition for a winding-up of this company compulsorily. Mr. Higgins, Q. C., who represented the company, said it was clear there must be a winding-up order.

Mr. Glassey observed that Dr. Siemens, whose process the company was formed to work, was out of pocket in the undertaking nearly £179,000, but still believed the concern could be carried on profitably. They were large government contractors, and it would be necessary to hold meetings under the Arrangement act, which could not be held till after a winding-up order had been made, because there were three or four debenture holders who threw difficulties in the way.

Mr. Higgins, while not opposing a compulsory order, was anxious that there should be no misconception as to the position of the company. The property was very valuable, and it was hoped that by a reconstruction the undertaking would be made successful. By far the great majority of debenture holders in number and value were in favor of a reconstruction, and it was hoped that when further proceedings had been stayed under a winding-up order, meetings would be held under the Arrangement act, which would result in the concern being placed upon a sound basis. It would be a great misfortune if the impression got abroad that the company was in an insolvent condition, especially as they had large government contracts for steel vessels. Mr. Bardwell, for holders of stock; Mr. Dundas Gardiner, for trustees of the debenture deed, and Mr. Ingle Joyce, for the holders of debentures to the amount of £15,500, who constituted the minority against the reconstruction scheme, also desired that a compulsory order might be made. The Vice-Chancellor made the order, and directed that the interim liquidators and their authority to carry on their business should continue until further order.

H. D. SMITH & CO.,

Plantville, Conn.,

Manufacturers of the

BEST QUALITY CARRIAGE MAKERS' HARDWARE.

Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.

SARANAC HORSE NAIL CO.

Polished or Blued Horse Nails, Hammered and Finished.

The Saranac Nails are hammered hot and the finishing and pointing are done cold. Quality is fully guaranteed. For sale by all leading iron and hardware houses.

S. P. BOWEN, President and Secretary.

J. W. LYNDE, Treasurer.

PLATTSBURG, N. Y.

Coal Shovel, Size 6, No. 1061.



HUSSEY, BINNS & CO.,

Pittsburgh, Pa., U. S. A.

Moulders, No. 1627.



SHOVELS, SPADES AND SCOOPS.

Railroad, No. 1123.



We guarantee our

RAILROAD SHOVELS

AND

Smooth Back Locomotive and Coal Scoops

Superior to any in the market.

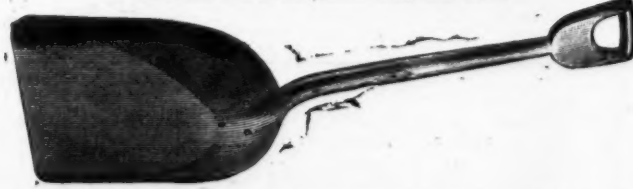
Smooth Back Locomotive, No. 3031.



Railroad, No. 1121.



Smooth Back Locomotive, No. 3051.



SPECIALTIES:

Railroad Shovels and Locomotive and Coal Scoops.

Philadelphia "STAR" Bolt Works.

NORWAY IRON

FANCY HEAD BOLTS,

Carriage & Tire Bolts. Star Axle Clips, &c.

TOWNSEND WILSON & HUBBARD 2301 Cherry St. Philadelphia Pa.

THE STANLEY WORKS,

MANUFACTURERS OF

Wrought Iron Butts, Hinges

DOOR BOLTS,

Plain, Japanned, Bronzed and Plated.

We are prepared to furnish all kinds of

WROUGHT IRON BUTTS, both Common and Bright Finish.

FACTORIES:

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New Britain, Connecticut. 79 Chambers St., New York.

JOHN ADT,

20, 22, 24 and 26 Artisan Street, New Haven, Conn., U. S. A.

Automatic Machines for Straightening and Cutting Wire of all sizes to any length.

Automatic Machines for Cutting and Forming Wire in various shapes.

HARDWARE MANUFACTURERS' TOOLS.

Send for circulars.

HAYDEN & SMITH,

Auburn, N. Y.,

Manufacturers of the best

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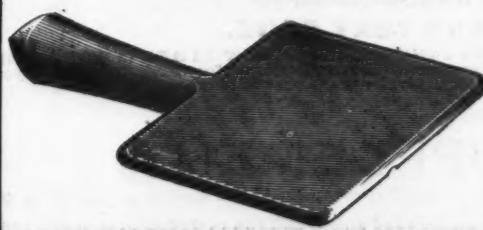
Carriage Hardware,

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Seat Fasteners,

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Send for Catalogue.



SABIN MFG. CO.,

MONTPELIER, VT., Manufacturers of

PATENT DOUBLE ACTING SPRING BUTTS,

Sabin's Lever Door Springs

For Heavy Doors.

The BOSS and CROWN SPRINGS for Screen and Light Inside Doors.

General Agents. HENRY BROOKS & CO., 127 Milk Street, Boston.
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KELLOGG, JOHNSON & BLISS, 108 Randolph Street, Chicago.

American Improved Syringe, 15 inches long; diameter, 1 1/2.



Brass Green-house Syringes and Pumps, Brass Tubes, Fine Mandrel-drawn Tubes of all sizes and thickness, manufactured by HUNT, T. DEAKIN & CO., 500 N. 13th St., Phila.
N. B.—Tubes for sliding one within the other made to order. Send for Circular and Price List.

Northern Liberty Works,
312 and 314 Green Street,
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ALFRED BOX & CO.,

Manufacturers of

Universal Radial and Stationary Drills, Engine

Lathes, Milling Machines, Steam Engines,

Shafting, Hangers, Pulleys, Hoists,

Elevators, Patterns for Chain

Wheels, &c.

Also Sole Manufacturers of

BOX'S PATENT

Double Screw Port-

able Hoisting

Machine.

Extra lift per

foot.

8 ft. 1,000 lbs. \$25.00

8 " 2,000 " 30.00

8 " 3,000 " 40.00

8 " 4,000 " 50.00

8 " 6,000 " 75.00

8 " 8,000 " 95.00

8 " 12,000 " 150.00

8 " 16,000 " 225.00

8 " 20,000 " 300.00

Your orders respectfully

solicited.

ALFRED BOX & CO.

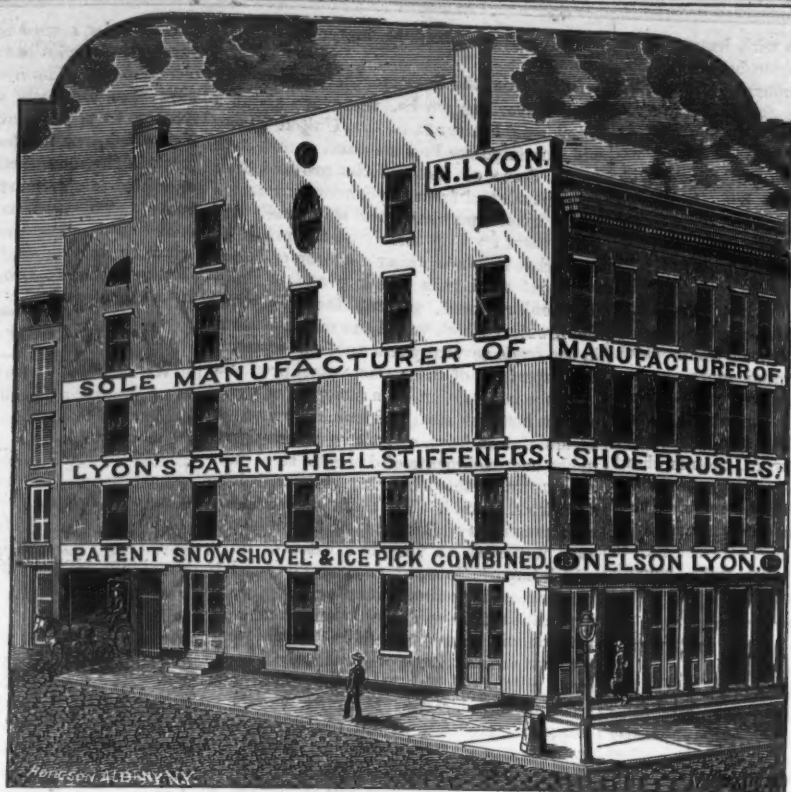
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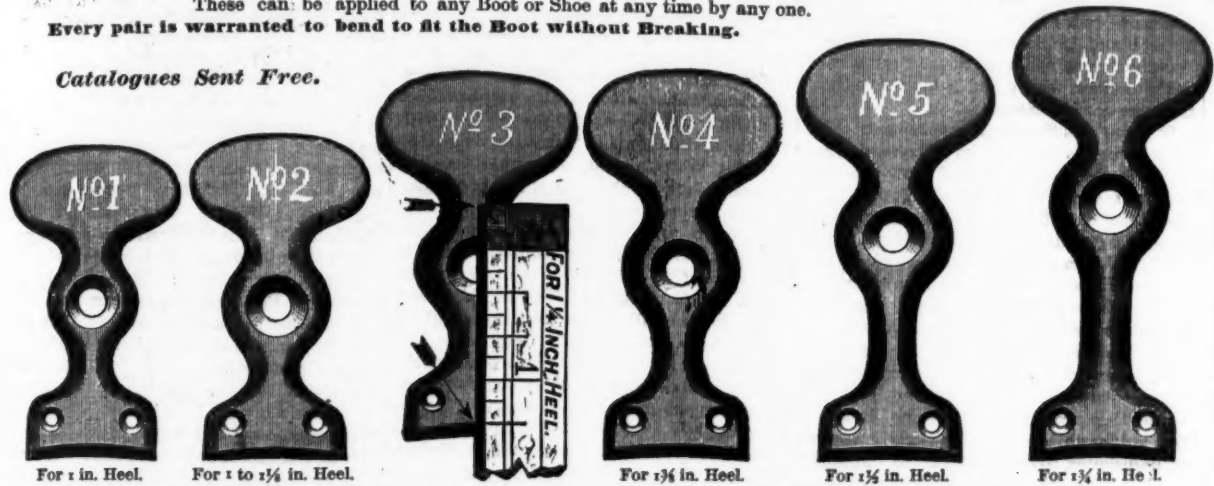
ALBANY, N. Y.

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Lyon's Patent Metallic Heel Stiffener.

These can be applied to any Boot or Shoe at any time by any one. Every pair is warranted to bend to fit the Boot without Breaking.

Catalogues Sent Free.



For Sale by all Wholesale and Retail Hardware Dealers.

Patent Adjustable Bolt Holder,

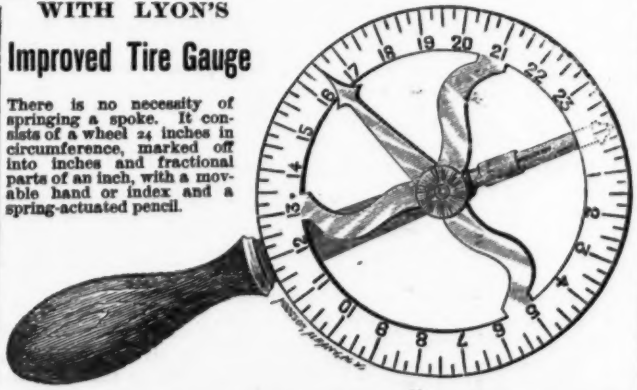


Also
**POLE AND
Thill Coupler.**

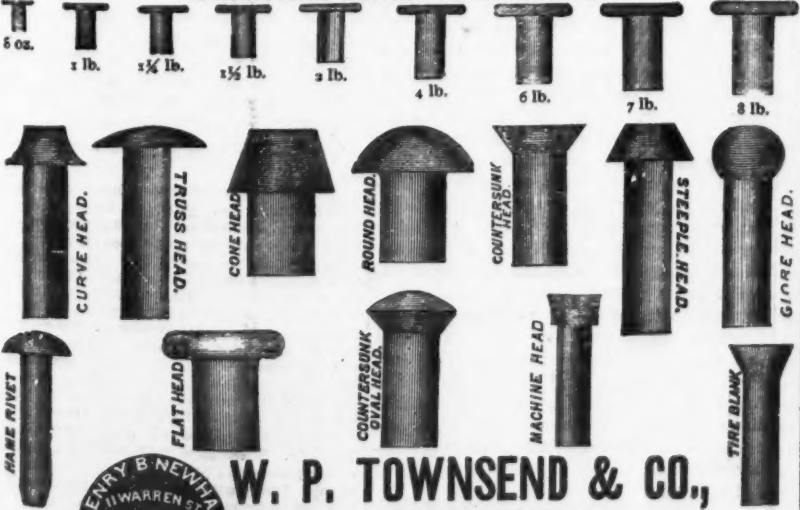
From Ten to Twenty-five Dollars a Year can be saved in time and bolts by every Blacksmith or Wagon Maker, in purchasing one or both of above tools for holding Tire or other Bolts from turning while removing or tightening up the nut.

WITH LYON'S Improved Tire Gauge

There is no necessity of springing a spoke. It consists of a wheel 24 inches in circumference, marked off into inches and fractional parts of an inch, with a movable hand or index and a spring-actuated pencil.



BLACK AND TINNED IRON RIVETS.



W. P. TOWNSEND & CO.,
PITTSBURGH, PA.,
Manufacturers of every description of First Quality

RIVETS.

AN ENGINE

that works without Boiler. Always ready to be started and to give at once full power.

**SAFETY, ECONOMY,
CONVENIENCE.**

Burns common Gas and Air. No steam, no coal, no ashes, no fires, no danger, no extra insurance. Almost no attendance.

THE NEW

"OTTO" SILENT GAS ENGINE.

Useful for all work of small stationary steam engine. Offered in sizes of 2, 4 and 7 H. P. Send for Illustrated Circular.

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Manufacturers of
Calkers', Carpenters', Stone Cutters'
Tin, Copper and Boiler Makers'
MALLETS,

Hawking Beeties, Hawking and Calking Irons;
also all kinds of Handles, Sledge, Chisel and Hammer
Handles. Also
COTTON AND RALE HOOKS.
Patented Feb. 13, 1877; a new combination of Hooks.
456 E. Houston St., New York City.

B. KREISCHER & SONS, FIRE BRICK AND CLAY RETORT WORKS.

Established 1845.

Office, foot of Houston Street, East River,
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The largest stock of Fire Brick of all shapes and sizes on hand and made to order at short notice.
Cupsels Brick, for McKensie Patent, and others. Fire Mortar, Ground Brick, Clay and Sand. Superior Kaolin for Rolling Mills and foundries. Stone Ware and other Fire Clay and Sand, from my own mines at New Jersey and Staten Island, by the cargo or otherwise.

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Successor to

FALMER, NEWTON & CO.,

ALBANY, N. Y., Manufacturers of

FIRE BRICK

Stove Linings,
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Manufacturers of

FIRE BRICK

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DRAIN PIPE & LAND TILE.

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of reliable quality for all purposes, manufactured at the best New Jersey Fire Clays. Also, Architectural Terra Cotta, Fire Clay, Fire Sand, Kaolin, Ground Fire Brick and Diamantine Building Brick.

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Watson Fire Brick Manufactory

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have just completed an order for steel rails,

which in the history of steel-rail rolling

mills has never been equaled for rapid work.

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Wm. Batty, during a run of nine consecutive

turns, from Wednesday, Jan. 8, until

Tuesday, Jan. 14, night and day turn, of 12

hours each, aggregated the enormous number

of 6108 rails, weighing 1359 tons, in 108

hours, including stoppages for oiling the

machinery and other purposes. To show

what can be done, we give the last three

turns on the order, running 36 hours, from

Monday morning at 6 o'clock until Tuesday

evening at 6 o'clock. The day turn run on

Monday and Tuesday 720 and 756 rails,

making a total of 1476 rails. In the next

turn, on Monday night, 738 were made—a

total of 2214 rails in the three turns, or one

rail every 58 1/2 seconds. To deduct the supposed

necessary time consumed in stoppages,

would allow only 56 seconds to a rail during

a portion of the time. The rails were run

through 13 passes, were 30 feet in length

and weighed 50 pounds to the yard. When

cooled they were straightened, drilled and

loaded on cars as fast as made.—Taken of

Progress.

The Iron Age

AND
Metallurgical Review.

New York, Thursday, February 13, 1879.

DAVID WILLIAMS, Publisher and Proprietor.
JAMES C. EYLES, Editor.
JOHN S. KING, Business Manager.

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The State Department report the receipt of an important dispatch from the United States Consul at Amsterdam, Holland, stating that by "ministerial resolution" (which we understand to mean by vote of the Cabinet) the following rates of duty are fixed as part of the Netherlands tariff: "Tools of wood, iron, copper, steel and other metals as agricultural implements and sewing machines, are free of import duties; and it is stipulated that in this exemption are comprised all finished tools which serve mechanics as an aid in their work. Further, parts of tools, such as hammers, spades, chisels, &c., without handles, and augers without piercers, &c., provided they are in the condition in which they are bought by mechanics in the stores and afterward fitted for use by putting on the handles, piercers, &c. Tools of spelter or zinc remain dutiable, likewise mathematical, surgical, chirographical, optical and musical instruments." We confess we are unable to decide what is meant by "tools of spelter and zinc." Probably it is a bad translation.

The Causes of Commercial Crises.

The theory of Prof. W. Stanley Jevons, that commercial crises, of which one may be expected during every decennial period, are connected with sun spots, has been a good deal laughed at, but it is at least an ingenious hypothesis, which rests upon carefully observed phenomena. What Prof. Jevons calls his "present working hypothesis" as to the causes which produce a commercial crisis every ten years, may be briefly stated as follows: A wave of increased solar radiation favors the meteorology of the tropical regions, so as to produce a succession of good crops in India, China and other tropical or semi-tropical countries. After several years of prosperity, the six or eight hundred millions of inhabitants of those countries buy manufactures in unusual quantities; a good trade leads manufacturers to push their existing means of production to the utmost, and then to begin building new mills and factories. While a mania of active industry is thus set going in Western Europe, the solar radiation is slowly waning, so that, just about the time when manufacturers are prepared to turn out a greatly increased supply of goods, famines in India and China suddenly cut off the demand. "This," says Prof. Jevons, "is, I believe, the simple explanation of the overproduction so much complained of at present. Our practical men, despising all theory, and leaving the main factor in affairs (the sun) out of their calculations, just manage to make demand and supply not meet. Their arrangements are made about five years too late; just when they are in the depths of despondency, they ought to be actively preparing for the coming favorable change in the Indian trade, and when they are all hopeful and excited, the real opportunity has already slipped by. Although the examination of a great series of statistical and physical facts leads to the conclusion that the trade with tropical countries is the principal disturbing cause, a European mania is almost always complicated by variations in home industry, due to speculative sympathy."

The unfortunate part of this hypothesis is, that it places the prime cause of the fluctuations in the world's trade beyond the domain of economic science, and makes it an astronomical problem. If the productiveness of tropical countries is affected by the causes noted by Prof. Jevons, and to the extent he assumes to be the case, an increase or decrease in the solar radiation may be an important link in the chain of causes which gives us an alternation of prosperity and depression. The periodicity of what are known as crises, established by the panics of 1827, 1837, 1847 and 1857, is generally regarded as merely a coincidence, since the predictions of a panic in 1867 were not justified by the happenings of that and immediately succeeding years.

While Prof. Jevons is speculating upon the terrestrial effects of celestial phenomena, Prof. Thorold Rogers, of Oxford, contributes to one of our American reviews a thoughtful treatise on the causes of commercial depression. The first of these he believes to be the decrease in the production of gold and the consequent fall in prices. This cause, says Prof. Rogers, has been aided by a dangerous and excessive use of credits in insidious forms, evading control and relaxing the sense of caution and responsibility. Prof. Rogers also gives special prominence to the great wars since 1861. These all resulted in the over-stimulation of certain branches of industry, with extravagance and recklessness, and led to sudden and severe reaction. The effects of the recent war between Russia and Turkey are so evident in England at the present time, and Germany and the United States are still suffering so heavily from their recent wars, that no one can question the value of Prof. Rogers' argument on this point. Another and important cause he finds to be the malign influence of commercial dishonesty. "From the effects which flow from human passions and human vices, from ambition and greed, from the criminal acts which do mischief to all, though they are only directed against individual races or individuals, there is no escape, unless men sternly and steadily discountenance that which is as debasing as it is ruinous, and which, as nations become more united by the strong but subtle bond of reciprocal benefits, have a wider and therefore a more noxious sway."

Probably few problems have been more discussed, or with greater ability, than the causes of commercial crises. The fact remains, however, that they generally follow periods of great commercial activity, and that when they come they always find the business community unprepared for them. The only lesson which the merchant or manufacturer can draw from them is to keep his business well in hand, and to manage it from year to year so that no contingency shall arise which he is wholly unprepared to meet. A correspondent of *The Iron Age*, writing in 1870 from one of the iron districts which suffered most heavily from the panic of 1873, said: "Every iron works in this district is now enlarging, is just about to enlarge, or has lately completed an important enlargement." In many instances these enlargements were justified by the capital of the companies and their ability to carry large investments through periods of depression. In many others they left no margin of available capital,

or saddled the companies with heavy debts under which they have since been crushed. In this they followed the course described by Prof. Jevons, of tardy preparations to take advantage of a demand which was about to experience a heavy shrinkage. Now, we are well aware that *ex post facto* wisdom counts for little; but it is a safe rule in business that unexpected things are always happening, and in time of prosperity it is the part of wisdom to make provision for the contingencies of an uncertain future. It may be assumed that the fact of great and general prosperity shows that the causes are at work which will bring about a reaction more or less sharp and severe, and that a business policy, to be in the largest degree successful, should be so shaped as to produce the best results five years hence. In a word, the merchant or manufacturer must be cautious, provident and far-sighted. He should remember that in the average of years one business is as good as another, and that it is never safe to carry too much sail, even with smooth water and favoring winds.

The Substitution of Steel for Iron.

Until within a comparatively short time the limits of the use of iron and steel seemed to be well defined. Each apparently had its own sphere, into which the other did not intrude. Iron was used for all sorts of manufacturing purposes where strength only was required, while steel, then made in comparatively small masses, was used only where such a material was absolutely necessary—in tools, springs, &c., and in small articles which had to possess unusual strength. Steel was then made by the slow process of cementation, or the more elaborate method of casting in crucibles. Cast steel manufacturers contented themselves with the demands made on them by tool and implement makers, and iron manufacturers believed themselves secure in the domain which had belonged to them from the earliest times.

If there was then any presentiment of a great change about to take place in the iron trade, it was simply a belief that the days of wood were numbered, and that iron would be used for most purposes to which wood was applied. As iron bridges multiplied, and iron ships became numerous, and iron buildings increased, the manufacturers of iron became more strongly impressed with the conviction that that metal was destined to indefinitely extend its conquests over every other sort of constructive material. An iron manufacturer in those days—and they are only a few years distant—was looked upon as one who held the scepter of undisputed sovereignty in the industrial world. The manufacturers of steel went on quietly attending to the business which seemed to belong to them legitimately, and the very much higher price of their product appeared to be a bar against its general employment in construction &c. Within a few years the situation has changed. A writer in the *London Times* of January 3, who seems to be especially well informed on the subject, says that in 1878 the United Kingdom made not less than 850,000 gross tons of Bessemer steel and 150,000 tons of Siemens steel; making a total of 1,000,000 tons of these "mild" steels. Some of this immense product has supplanted crucible steel, but only to a limited extent, the great bulk of it entering into the manufacture of articles formerly made of iron. Boiler plates, ship plates, railroad bars, bridge shapes, merchant bars, and beams and girders are all made of this new material, so good and yet so cheap, so much more durable than iron, and only costing as much or very little more. The effects upon the iron rolling mills are easily summed up. In Wales the manufacture of iron rails is only one-tenth of what it was in 1870. In the North of England the iron rail trade is almost extinct. Everywhere iron works are standing idle, while steel works are enlarging their operations.

In the United States, although the same element is at work, the victory over the iron rolling mills seems to be more distant. It is estimated by the American Iron and Steel Association, that in 1878 we made about 650,000 gross tons of Bessemer steel and about 50,000 tons of open-hearth steel, or about 700,000 tons of both. A very large part of this product, however, went into rails, estimated at 550,000 tons. If it were not for this, the iron rail mills of the country would have an abundance of work; but as it is there are many mills that are doing very little, and a number of them have been permanently closed. Still, so peculiar are the requirements of this country, that in 1878 as many iron rails were rolled as in 1877, and for years to come, if we are permitted to regulate our own trade affairs without foreign interference, we may expect a continued, though restricted, demand for iron rails.

In other branches of the iron business the competition between steel and iron must continue to increase, and it may increase very rapidly. So many open-hearth furnaces are being built in connection with existing iron-works, that when they all get into operation they will far exceed the requirements of the so-called legitimate trade for steel, and they must make serious inroads on the business of the iron rolling mills. Even now screws and wire are largely made of Bessemer and open-hearth steel. Bridge work, boiler plates and stamping sheets are made to some extent of these steels, and its future

uses are more likely to increase than diminish.

Apart from the Bessemer and open-hearth steel converting works, there are about a dozen establishments in the United States which manipulate Bessemer and open-hearth steel. Some of these works procure their supplies of steel from the converting works, while others purchase old steel rails and work them up into merchantable products. A market is thus opening for crop ends and worn-out steel rails which promises indefinite enlargement, and satisfactorily solves the problem which vexed the minds of many in the trade several years ago—the economical disposition of these waste steel products.

In the prosecution of a struggle as grave as that between steel and iron, the manufacturers of iron have enough to contend with in the encroachments of domestic steel manufacturers, without bearing additional pressure from abroad. Yet there are considerable quantities of Bessemer and open-hearth steel imported at very low rates of duty, which importations, of course, only need to be increased gradually as they are increasing, until a time will come when their competition will be severely felt. These importations take the shape of steel rail ends, old steel rails, steel nail rods for horse nails, steel wire rods, &c. Measures should be taken to guard our manufacturers of both iron and steel from these inroads. The change to steel is taking place with sufficient rapidity, under domestic influences, to promise a serious curtailment of the business of iron rolling mills at no distant date, but if cheap foreign steel is to burden the market, great injury can be done at once.

The Development of the English Coal Trade.

The history of the English coal trade during the past five years has been peculiar, and as it brings into strong light points of general interest, a short summary of its development will prove valuable. It has of late been the experience of many branches of industry to be brought face to face with the stern ultimatum of "shutting down" or working without profit, or even at a loss. The questions involved in shaping a policy of such momentous importance to the welfare of an establishment are so numerous and perplexing, that we cannot wonder at the inclination often shown to shirk the issue. In the case of collieries, however, there is generally one circumstance which tends to strengthen the reluctance to surrender and place the establishment on the list of non-producers; it is the fact that abandonment means enormous cost in re-opening, and that suspension involves continuous expenditure for pumping, timbering, &c. This causes the process of "weeding out" to be a comparatively slow one; while, on the other hand, the possibility of considerably decreasing cost of production by distributing the fixed charges upon a largely increased output, makes every coal owner direct his efforts toward an increase of yield, often even drawing upon reserves and stopping dead work. These circumstances account for the anomaly of a growing production in the face of a falling market, especially in districts where work is done below drainage level. England, in 1873, was at the culmination of a period of unparalleled prosperity, and during that year the coal production increased 3,500,000 tons. In 1874, when trade was regaining its normal condition, the output showed a decrease, compared with 1873, of nearly 2,000,000 tons, but notwithstanding the fact that in the following year, 1875, depression was felt in all industrial pursuits, there was an increase in coal production of 5,000,000 tons, of which 10 per cent. only was absorbed by an increased export. In 1876 trade grew worse, prices declined, and still the production went on increasing at the rate of 1,600,000 tons, which in that year, however, found an outlet in an increased sale in foreign markets, amounting to very nearly as much as the surplus produced. When it became apparent that trade in the year 1877 was only to continue the disastrous course of the preceding period, a diminution of the supply was confidently looked for, but to the surprise of all, the returns proved that the output had actually been greater in that year by 1,200,000 tons than in 1876, although the sales to foreign markets had suffered a shrinkage of 1,000,000 tons. The following figures will show that this continued increase was accompanied by a decrease of the number of mines and the number of miners employed, and by a continued fall in price:

Year.	Output.	Export.	Value.	No. of Mines.	No. of Miners.
1872	123,492,000	12,991,000	\$46,311,000	.....	.....
1873	127,011,000	12,339,000	47,631,000	3627	477,000
1874	124,938,000	13,927,000	45,849,000	.....	.....
1875	131,861,000	14,475,000	46,163,000	4501	538,000
1876	133,470,000	16,299,000	46,670,000	.....	.....
1877	134,610,000	15,420,000	.....	4224	494,000
1878	.....	15,483,000	.....	.....	.....

We see from this that while the production increased the average output of each mine increased, or rather that a number of smaller collieries were driven to the wall, while the larger and stronger remained on the active list. The number of miners, it will be observed, was considerably lessened by the bad times, and still the total fruit of their labor was greater, showing that each miner worked more hours, as it is not probable that the average dexterity or industry displayed by the miners was any greater. In considering the curious relation between supply and demand in the English coal trade, it should not be forgotten that within the short

period under review one of its greatest consuming industries has experienced momentous changes. The iron trade of England in 1872 was variously estimated to consume from 30 to 34 per cent. of the entire output. Since then iron has been largely replaced by steel, in the manufacture of which only from one-third to one-quarter of the fuel is consumed. To what extent the demand for coal is lessened by this cause cannot be accurately ascertained, but we feel confident that 7,000,000 to 8,000,000 of tons will be an inside figure.

Waning Power of Labor Unions.

We seem to be nearing the beginning of a most important change in the relations of skilled labor East and West. It is a well-known fact that in certain departments of skilled labor, especially in iron and glass works, wages in the West have for years been higher than in the East. This difference has not only been maintained, but the percentage has been constantly increasing against the West. For example, some three years ago the majority of New England mills were paying \$3.50 for boiling, the Philadelphia mills \$4 to \$4.50, while Pittsburgh was paying \$5. Pittsburgh still pays this price, while boiling in New England is from \$2.50 to \$3, and at Philadelphia \$3.60. It is a fact that is recognized by both manufacturers and workmen, that the wages battle-ground in certain industries is Pittsburgh. Not that wages troubles in these industries do not occur at other points, but any letting down in wages at Pittsburgh means a reduction at other points as well. The Pittsburgh workmen have, as a rule, been willing to fight these battles, as they have generally won; the trouble has soon been settled, or the workmen at other points have aided them in the struggle, and expressed a willingness to go still further when occasion required. The Pittsburgh workmen are commencing to doubt the good faith of the workmen at these other points, and are beginning to ask why they should continue to fight others' battles if they are not supported by demands for the same rate that Pittsburgh pays. They are beginning to realize the truth of what they have been told, that their course was driving manufacturing establishments from Pittsburgh. This has been strikingly apparent in the case of two Pittsburgh industries within a few months. The chimney glass blowers of Pittsburgh have been on a strike for 22 months, and up to last week there was no prospect of a settlement, when the Lamp Chimney Blowers of the United States and Canada held a meeting at Pittsburgh, which, it is asserted, had been called by the Pittsburgh blowers for the purpose of establishing a uniform scale of prices. This the blowers outside of Pittsburgh refused to grant, and virtually laughed at those who had been fighting their battles for two years. The convention adjourned, and the next day two of the most prominent of the strikers gave up the fight. And now the chimney blowers' strike may be regarded as virtually at an end. This is a result that must follow in other trades and branches. There is no reason in the nature of things why boiling should be from 33½ to 100 per cent. more in Pittsburgh than in Eastern mills. The work is no harder, if as hard, and the price received for iron at the West no more.

Mr. Benner Rises to Explain.

Most of our readers have seen or heard about a little book popularly known as "Benner's Prophecies." Those familiar with it will remember that, while the predictions respecting 1876 and 1877 were correct, those respecting 1878 failed. Mr. Benner's attention having been called to the fact that his prophecy of an advance in the price of pig iron in 1878 over the average of 1877 was not vindicated by the happenings of that year, he sends in reply the following cheerful letter, which is full of pleasant prediction for the immediate future:

DUNDAS, OHIO, Jan. 21, 1879.
DEAR SIR.—I have yours of the 17th at hand. You raise the question, What is my opinion of the non-fulfillment of the prophecies for 1878? On page 114, the book says: "Congress made a mistake in not fixing Jan. 1st, 1878, as the time for the resumption of specie payments. This delay will cause the government and people to lose 12 months of recuperative strength in the great commercial and financial battle of 1891." Here is where the trouble was. The great scarecrow, resumption, cast its blighting shadow before it, which continued to cause the decline in prices for hogs and iron, after the winter of 1877-78. We have now passed the River Jordan—on the up grade. Business is now reviving; confidence is being restored; prices have commenced jumping up. [See pork at Chicago for this year.] Pig iron will show us something of an advance by the middle of the summer. Prices now for hogs and pig iron will advance rapidly to make up for the year 1878, and the high points which I make in my book will all come around right—hogs at high price in 1880; pig iron at high price in 1881. The banks and people have plenty of good money—something we were short of in former hard times; for instance, 1840, 1861, &c. It is my opinion that speculation will commence now and carry things along lively. Yours,
SAMUEL BENNER.

If Mother Shipton is right in her historic prediction, that "the world to an end will come in 1881," we shall not be here to fight the "great commercial and financial battle of 1891;" but of the two, we think it probable that Mr. Benner is the nearer right.

A Western journal describes a new form of wire fence as follows: "It is horse high, bull strong and hog tight." For brevity and comprehensiveness of description this is

eminently satisfactory, and cannot fail to commend itself to the agricultural mind.

New Movements in the California Trade.

On another page we print an interesting article on the Pacific railroads and California freights, which gives some information additional to that contained in our editorial remarks last week. Whether the railroad managers can sustain themselves in the position they have taken, is just now a question of great interest to all who are connected with the Pacific coast trade. The first vessels to sail by the Cape Horn route since the policy of the railroad managers was fully developed, are only just beginning to arrive in San Francisco, and for this reason it is too soon to know how those who receive goods by water will handle them in opposition to the combination between the railroad and the merchants. While the great power of the railroad is fully acknowledged, there are many who do not hesitate to say that it is by no means able to carry out its plan. A great deal of experience, ability, cunning and capital will be brought to bear for the overthrow of the monopoly. A single illustration will show how strong is the pecuniary motive which will influence the opposition. A large quantity of nails, lately shipped from this port, are about to arrive in San Francisco. These, owing to the cheaper transportation by water, can be profitably marketed 10 per cent. below the cost of nails delivered in San Francisco by rail. As the large jobbers are prohibited from touching these nails by the terms of their contracts with the railroad, some one not in the ring will undertake their distribution to the retailers and large consumers, and if the shipment is even fairly profitable, others will follow in quick succession. The result will be that the houses which are manacled by the railroad, will find that their customers are being supplied by others. Their combined influence to hold their trade will be powerless against a 10 per cent., or even a 5 per cent. margin on anything which sells as close as nails. We see no reason why the same thing should not happen in all lines of heavy goods, if their season is anticipated by early shipment round the Horn. This would make important changes in the trade of the Pacific coast, and the margins are certainly large enough to encourage a great many to go into the importing business who have hitherto refrained from engaging in it.

The promises with which 1878 opened, regarding immigration of the unemployed from the overcrowded cities and manufacturing districts of the older States to the agricultural districts of the West and South-West, have been verified. There were only 147,000 immigrants in 1877, of whom not more than 80,000 settled. Last year, however, they numbered over 600,000, nearly all of whom were from the Atlantic States. Of these it is claimed that 200,000 settled in Texas, 125,000 in Kansas and 100,000 each in Nebraska and Dakota. These people have taken up at least 14,000,000 acres of land. The indications are that the inland immigration will not be so great this year as last, but the foreign immigration will be much greater. For the 12 months ending Jan. 31, 1879, the number of immigrants arriving at the port of New York was 82,125, as against 66,170 for the same period ending Jan. 31, 1878. The great depression in other countries will stimulate immigration, and it will be found that it will include a larger proportion of skilled workmen than for some years previous.

The Pittsburgh Chamber of Commerce has published, in pamphlet form, the address of Mr. Joseph D. Weeks on arbitration, which appeared in our last issue. Ten thousand copies have been printed, and will be circulated among the manufacturers and workmen in that district.

New Publications.

MANUAL FOR ENGINEERS AND STEAM USERS. By John W. Hill, M. E. Published by William A. Harris. Price 10 cents.

This little manual, published by the manufacturers of the Harris-Corliss engine, is in its aim similar to many of the "pocket-books" issued by bridge builders and others. It contains quite a mass of useful information, compiled from a variety of sources. It is intended chiefly to serve as a guide to the users of steam engines.

THE STRENGTH OF MATERIALS. By William Kent, M. E. Van Nostrand's Science Series, No. 41. Price 50 cents.

A great element of success in all manufacturing industries is a close study of the demands of consumers, which should not be limited to their prompt discovery, but must extend to a thorough appreciation of the reasons which call for them, and the ends which the improved product is to meet. We do not wish to insinuate that it is the duty of producers to rival their customers in the knowledge of their own business, but would point to the necessity of being familiar with the general drift which improvement is taking. Thus, for instance, we believe that the self-interest of iron and steel manufacturers and their engineers requires their devoting some attention to the demands made by constructors upon metals, and to the means used by them to ascertain whether and how far their requirements are met. Many of the so-called "tests" made to determine the strength of iron and steel for engineering constructions are unreliable, they are generally not sufficiently exhaustive, and in many

cases worthless or positively injurious because they are misleading. Under what conditions tests should be made, how specimens should be prepared and how they should be tested, are matters which every manufacturer or engineer should have at his fingers' ends. The importance of mechanical tests is generally conceded, but, unfortunately, the conceptions of their present and prospective value are often crude and erroneous. The information on the subject is either laid down in elaborate professional works, or in single papers read before engineering societies, which makes them inaccessible. In the little work before us, Mr. William Kent, a scholar and for some time an assistant of Prof. Thurston, who is an authority of international fame on the subject, has summarized the present achievements of experimenters, and pointed out in an able manner the large field which is still open for research. The author urges the necessity of adopting some standard shape of short specimens for the determination of tensile strength. He points out how conflicting and incomplete is the whole matter of compressive strength, and proposes as a standard size for a compressive test, a cylinder one inch in length and one-half square inch in section, and for the limit of compression equivalent to fracture 10 per cent. of the original length. In the examination of shearing stresses, a complex subject, much work remains to be done; while, on the other hand, in torsional experiments, Prof. Thurston has achieved his remarkable successes. Mr. Kent seems to have devoted much attention to a study of the resistance of materials to continued and to repeated stresses, to sudden shocks and to vibrations. He forcibly points out the necessity of settling what relation exists between tensile, compressive or torsional strength and ductility on the one hand, and resistance to repeated shock on the other. He appeals repeatedly to the government as the proper party to extend some aid for settling these and many other important questions, which we think are so urgent that they should not be left to await the tardy recognition of Congress. The matters so directly affect large interests, both of producers and consumers, that it would seem to be their province to take energetic action in this matter. Mr. Kent has done a good service to manufacturers, to whom we recommend his work as an intelligent, brief and clear statement of the present status of the question.

Metallurgical Notes.

THE ELLERSHAUSEN PROCESS AND THE OPEN HEARTH STEEL MANUFACTURE.

It may be of interest to some of our readers who remember the once famous Ellershausen process with regret, to learn that it has not ceased to occupy the minds of metallurgists on the other side of the Atlantic. In a modified form it has retained an advocate in Prof. Ackerman, who, in a recent paper, states it as his opinion, that for those works which do not possess a sufficient supply of good iron or steel scrap, but which are in close proximity to a blast furnace and can procure rich and pure ores, the Ellershausen process offers a cheap means for obtaining on a large scale a material suitable for the open-hearth process. He contends that while there was no reasonable hope for making a uniform, solid product by heating the mixture of pig and ore made by Ellershausen process to a welding temperature, there is no doubt that the iron in the ore is more thoroughly utilized, and the walls of the open-hearth furnace are less exposed to wear, if the pig and ore is first mixed outside of the furnace. He thinks that the main element of success will be fulfilled if the flow of iron and powdered ore is so regulated, that the quantities filled into each mold of the rotating table is so small that the mixture is chilled before it ceases to be thorough. According to this it would seem as though Ellershausen has had the misfortune, like many inventors, of being in advance of his time; although in other respects he has hardly had the proverbial misfortune of inventors.

ESTIMATION OF COPPER IN STEEL.

As much importance is deservedly attached by many metallurgists, especially in Austria, Germany and Sweden, to the determination of the amount of copper in steels submitted to analysis, we would cite the following method for its determination, as given by Mr. Andrew A. Blair, formerly chemist to the United States Test Board, and now a member of the well-known Philadelphia firm of chemists, Messrs. Booth, Garrett & Blair. It is a modification of Luckow's electrolytic test, first practiced for copper ore at Mansfeld, Germany: Weigh out 5 grams of borings into a beaker of about 750 c. c. capacity, and dissolve in a mixture of 30 c. c. of hydrochloric and 15 c. c. of nitric acid. When the solution is complete, boil for some minutes, dilute and filter through a ribbed filter, wash well, heat the filtrate almost to boiling, add 10 c. c. of sulphate of ammonia, nearly neutralize with ammonia and boil until colorless. Add 5 c. c. of hydrochloric acid, and pass sulphuretted hydrogen through the boiling solution until the precipitate of sulphur, &c., agglomerates. Filter on a ribbed filter, wash with boiling water and dry the filter and precipitate. Ignite carefully in a porcelain crucible, and when the filter is perfectly burned, allow it to cool and digest at a gentle heat in nitric acid with a few drops of sulphuric acid, covering the crucible with a watch glass. When the sulphide of copper is perfectly decomposed, remove the watch glass and evaporate off the nitric acid until fumes of sulphuric acid appear; cool, dilute a little, and wash out carefully into a small platinum crucible, which is placed in a ring suspended from a stand, being held by a screw, which is also arranged for receiving the conducting wire of a battery. The second wire from the battery is attached to a similar screw, which carries a small platinum spiral, which is lowered until it is just clear of the bottom of the crucible. At first two cells of a battery are attached, but in from three to four hours the third one is added, the operation being continued for one hour. The crucible is then washed out, first with water and then with alcohol, after testing the solution

for copper. Then it is dried at about 100° C. for a few minutes, left to cool and weighed. If the precipitate is dark colored, it may be dissolved in a few drops of dilute nitric acid and the copper precipitated as before, when it will always be perfectly bright and metallic in appearance. Dissolve out the copper with a little nitric acid, wash out the crucible with water and alcohol, dry and weigh. The difference will be the copper. The extreme delicacy and accuracy of this method are beyond all praise; 0.1 milligram can be detected and estimated.

RIVAL MILLS.

The following items, the first from the Harrisburg *Item*, and the second from the *Scranton Republican*, show that the rivalry between the mills of that section of the country continues. On Wednesday night the rail mill made 662 rails, working from 6 o'clock p. m. until 5.30 a. m. This is the largest run ever made at these or any other works in the country in the same period of time. The rails were 30 feet long and weighed 50 pounds to the yard and run through 13 passes, which is two more than the usual number of passes. The Scranton Steel Mill made, Jan. 9, 800 bars in 11 hours 15 minutes; Jan. 10, 800 bars in 11 hours 45 minutes; Jan. 11, 800 bars in 11 hours 45 minutes. And for the week ending Jan. 18, rolled 4784 bars in 6 turns of less than 12 hours each, an average of 797½ bars per turn, done also on 15 passes, and not on 13 passes as at Harrisburg.

EARLY PATENTS FOR THE OPEN HEARTH STEEL PROCESS.

As an instance of the manner in which great industrial conquests are foreshadowed by the struggles of pioneers, whose heroic fights for recognition deserve sympathy, we would cite some early English patents in which many points essential to the successful working of the open-hearth steel process were recognized. The earliest attempt made in England before 1802 were alluded to in a recent issue of *The Iron Age*. The record of a later effort we find in the English Patent Office, by Josiah Marshall Heath, who seems to have wasted his energies and his substance upon his schemes, perishing in India in the government service. His first patent specification, No. 8021, dated October 5, 1839, is a curious document. He describes and claims the manufacture of a pure cast iron in a blast furnace, without the use of any vitreous flux, slag or cinder, from pure native oxides and carbonates. This pure product he converts into steel of any required degree of hardness by melting it in a cupola, adding iron scrap and sesquioxide of manganese, taking care not to use much fuel in order not to "doxidize the manganese, nullify its decarburizing action upon the cast iron, and thus prevent it from reducing the metal to that lower stage of carburet which constitutes cast steel." He proposed to complete the decarburization to the required degree by subsequent concentration. In another part he claims the employment of carburet of manganese in preparing an improved cast steel. In a subsequent patent, No. 10,795, dated February 4, 1845, Heath states that he had found that "the decarburization of the pig might be more conveniently and perfectly accomplished by performing the process of decarburization in an apparatus distinct from that in which the pig iron is melted." He urges that the fluid pig iron should be run into a receptacle made of any material capable of withstanding an intense heat, similar in form to a common refinery or to the shallow well of a reverberatory furnace, the interior of which should be kept at the highest temperature that can be produced. He states a convenient method of producing this high temperature to be by means of currents of ignited carbonic acid gas, conveyed through pipes placed round the top of the receptacle, slightly inclined downward so as to bear upon the surface of the fluid metal. In order to burn the carbonic oxide, he declares it to be necessary to introduce along with it a current of hot atmospheric air, but he does not claim any method of producing the high temperature required. For decarburizing the fluid iron he mixes it with a certain portion of malleable iron, the quantity depending upon the hardness of the product required and the quality of the pig. He mentions also that malleable iron produced directly from the ore, and heated to redness in a preheating chamber attached to his furnace, would be a very convenient form. It is striking that in this specification former claims for the use of oxides of manganese or of carburet of manganese were entirely abandoned.

QUICKSILVER PRODUCTION OF CALIFORNIA IN 1878.

The *Commercial Herald* of San Francisco, Cal., gives the following data on the shipments of quicksilver from the mines of California to San Francisco:

Mines.	Flasks.
New Almaden.....	15,249
New Idria.....	5,138
Guadalupe.....	9,347
Sunderland.....	564
Abbot.....	144
St. Johns.....	729
California.....	1,487
Napa Con.....	3,254
Great Western.....	5,194
Oceanic.....	1,691
Sulphur Bank.....	8,778
Redington.....	6,591
Oakland.....	1,602
Altos.....	1,550
Phoenix.....	531
Cloverdale.....	108
Mines.....	500
Total.....	62,476

This, as compared with the production of 1877 and 1876, shows a falling off of 16,124 flasks, and of 12,593 for these years respectively. If to these figures 1008 flasks are added, as the amount shipped directly from the mines to the gold and silver mills, it will be seen that 63,484 flasks covers the entire production for 1878. The exports from San Francisco during the same period footed up to 34,280 flasks, of which 20,445 went to China and 10,812 to Mexico. Compared with the year preceding, the export amounted to 12,000 flasks less, which is chiefly due to the falling off of the demand in China, which took almost 11,000 flasks less in 1878 than in 1877.

CASE-HARDENING IRON.

In order to economize in the more expensive materials for case-hardening cast

wrought or malleable iron, and to harden only portions of the article in different degrees, if required, Mr. Gracie S. Roberts, of Brooklyn, makes use of an improved method. After polishing the surface, he glues to the portions to be case hardened a coating of yellow prussiate of potash. A number of coats are given, according to the degree of case hardening required. A cheaper material or simply boneblack is used where a slight effect only is required. When the glue is set hard, the article is packed in powdered charcoal, heated to redness in a quick fire and maintained at that heat for half an hour. Then it is hardened and tempered in the usual manner.

IMPORT OF FOREIGN ORES INTO THE NORTH OF ENGLAND.

So much has been written of late of the increasing dependence of the English iron and steel industry upon supplies of ores from foreign countries, notably Spain, that it will be of interest to state the following figures for 1878: The amounts imported into the Tees, Tyne and Wear respectively, were 177,928, 149,004 and 51,940 tons—almost the whole coming from Spain. Bilbao figures prominently with 131,072, 115,263 and 48,952 tons, while Elba contributes only about 14,000 tons in all.

Coercion by Railroad Monopolists.

The combination of the Pacific Railroad companies to compel merchants to ship by their lines rather than by the water routes, is odious in a twofold sense. The manifest injustice of such an attempt, as affecting mercantile interests, is bad enough, but the attitude of hostility thus assumed against our ocean commerce aggravates the offense. A railroad born of the nation's generosity no sooner feels its strength than it proclaims war against our mercantile marine, and this, too, at a most critical period, when various influences conspire to drive our flag from the ocean. But all patriotic sentiment aside, where, as at present, the immediate issue presented is a question of self-preservation, let us see the practical working of the antagonism of the Pacific railroads and our shipping employed in the California trade. If the railroad agents find that goods are being shipped via Cape Horn, then commences a reckless cutting of rates, transportation by rail being offered for almost nothing rather than lose the business. Within a week an offer was made to take common bar iron to San Francisco at \$15 per ton, or, as remarked by the agent when leaving, "perhaps \$12," while for railroad iron the rate was \$30 per ton. Why this difference in transporting articles of the same class, equally difficult to handle? It is suggested that in the one case there may be interference with some pet speculation—that shipments might tend to bear the market.

Rates by sail are very low, say for nails 30 cents a keg; other hardware \$6 to \$8, or about one-half of former rates, when whole cargoes were taken at \$12 to \$13 per ton. Railroad rates for the same articles at present are probably \$40 to \$50 per ton. Obviously the clipper would secure the bulk of the heavy freights if competition were left free; but the contracts which merchants and shippers in the California trade are compelled to sign, as noted in our editorial remarks last week, prevents them buying, receiving or handling any merchandise carried by water. If the monopoly thus created can be sustained long enough, the clipper will be driven from the California trade. Indeed, the railroad magnates already predict that a year hence there will be no more clipper left in the trade. According to the calculation of one of our largest shippers, who is sending out on an average two cargoes a month, there are dispatched from New York to San Francisco about 60 ships a year; and it is thought probable that, should the railroad interest continue as hostile as at present, this number, within the next twelve months, may be reduced one-half. But there is no fear of the immediate extinction of this class of vessels. Grain-growing is a great industry on the Pacific coast, and so long as the wheat crop is produced so long will ships go there for it. To make a paying voyage, a ship must have a certain amount of earnings, from some source or other, on the round trip. If her freightage outward from New York is reduced one-half, it must be increased proportionately in the cost of grain transportation. The loss comes on the farmer, as he must sell his produce just so much cheaper to meet the foreign market. Thus the railroads, while enriching themselves by a grasping policy, as unjust as it is shortsighted, do so at the expense of the agricultural interest of the Pacific States.

It will also change the whole character of trade. Take the experience of a dry goods man, who agrees to send by rail at from \$60 to \$100 per ton. Another merchant ships similar goods by sea at \$10 a ton, or half a cent a pound. As a result trade is demoralized, for no uniform price can govern the market where it is disturbed by such abnormal movements. It is evident that to accomplish their object, to succeed in their rivalry with sails, the railroad people must bring within their control every merchant from California to Oregon. Having gained this end, hundreds of smart men in the East discover that by shipping around the Horn in advance of the season, they can undersell through agents to the retail trade. The consequence is that shippers by rail will find their business gradually leaving them, and a new set of merchants in the market who come in to compete.

While on the subject and to aid in a clearer comprehension of the case, let us review the situation. It was last August that a scheme was first announced and carried into execution, by which it was sought to concentrate upon the overland route the entire freight movement between the Atlantic cities and West coast.

Without previous notice the Union Pacific Railroad Company advanced their tariff from \$6 to \$12 per ton, placing shippers and others previously under contract in a fearful dilemma. This was immediately followed by a proposition, most graciously tendered, by which the victims could find their way out. They were privileged to avail themselves of a sliding scale on a re-

duced rate, ranging from 2½ to 6 cents, providing shippers would bind themselves to forward their merchandise for one year exclusively by rail. Numerous contracts were promptly made on this basis, but the promised reduction gave no immediate relief, all bills of lading being made out at the advanced rate, accompanied by a stipulation that, at the expiration of a certain period, the shipper would be entitled to a rebate, provided he strictly complied with the condition specified, that of forwarding goods by no other route. With this lash brandished about their ears—the danger of forfeiture of drawback—it was believed merchants could be kept in submission. The monopolists, moreover, reserved the right to terminate the arrangement at pleasure.

From the foregoing it will be seen that the situation in which large classes of business men find themselves is quite extraordinary. In the first place, almost the entire body of merchants on the Pacific Coast, under specious representations or ominous threats, have been induced to sign a contract degrading in its terms, because requiring a surrender of private rights. As the rule, these merchants jumped at the enticing bait, for a low rate of freight—a reduction of one-half from former charges—was in itself very desirable. Besides, there was little time permitted for deliberation; there must be prompt decision one way or the other, so that in a number of instances the Eastern partner of a house knew nothing of the contract until it was signed, sealed and delivered. Those who kept aloof were soon made to feel very uncomfortable. Still another class, comprising not a few who unwittingly committed themselves, now unhesitatingly denounce the whole movement, but *sub rosa*, for the railroad folks might hear of it. Others, though not prepared either to denounce or defend the measure, simply acquiesce because "there's money in it." Indeed, they admit that it is wrong in principle, but the railroad men were shrewd enough to see their opportunity and seize upon it; it was only human nature to do so. Moreover they are sorry for the "clipper" folks, who find themselves in a tight place, with their business fast ebbing away. They are sorry for neighbors in the trade who are not in the pool and find it impossible to compete, but really they don't see how the matter can be helped. Finally, as regards the merchants at large, with the exception of those identified with sailing ships, it is acknowledged that they are gagged and bound; under no circumstances can they consent to be so much as named as hostile to the railroads or parties to any controversy. Plainly speaking, they are not prepared to bring down on themselves the displeasure of a great corporation, which has power to harass beyond endurance, and even to destroy.

Thus, in surveying the field, it appears that there are only about five large shippers of freight in the entire trade with San Francisco who are making anything like a vigorous fight, and among these, as might be expected, the feeling of indignation and excitement is intense. Behind these are a large number of the rank and file, who brood over their grievances in secret, too timid to venture from their cover. No one seems able to suggest a practicable remedy for the existing evils, hence the appeal to Congress to break the power of the Pacific railroads, by legislation looking to the regulation of interstate commerce.

One point to be observed in explanation of the tactics now resorted to, is that the railroad company, having subsidized the Pacific Mail steamers, giving them a certain amount in money whether they have earned it or not, all that can be squeezed out in freight money lessens the pecuniary obligation exactly to that extent.

During the past week we have received the following communication, relative to the effort of the Pacific Railroad management to destroy the shipping interest:

To the Editor of The Iron Age.—DEAR SIR: Much dissatisfaction with the Pacific railroads is manifested in some quarters among freight contractors who are bound to the railroads, and who find the clipper freights reduced and their competitors shipping goods which must inevitably come in competition with their own, shipped by rail at greatly higher rates. The extinction of the clipper-ship competition around Cape Horn, aimed at by the railroad managers, was thought, no doubt, to be a brilliant conception, but the execution of this plan may prove to be no easy task. Ships are now leaving Atlantic ports at the rate of one a week, with full assorted cargoes. Most of the shippers by these vessels speak feelingly of the manner in which railroad agents have attempted to seduce them into contracts, under stipulations which they say are inconsistent with their self-respect. To be bound by a railroad or any other company as to the manner in which they may be permitted to conduct their business, is something new in American citizenship. These clipper ships are the production of the best American marine architects, and are viewed with just pride by the American people. They have been paid for in honest money in the spirit of legitimate enterprise, and certainly have enough to contend with without being assailed by an enemy in the guise of a friend and under government protection. They ask no subsidies or enormous grants of land from the public domain, and their obligations, of whatever kind, taxes or otherwise, are promptly met. All they ask is that the railroads that have been built and subsidized with the people's money, shall not be used to destroy them and drive them from the flag. Fair competition is all they ask, and the least they have a right to expect, from their own government; but the railroads, in the spirit of a grasping monopoly, now seek to deprive them of any share in the transportation business of the country, and to crush out the very class of people who gave most liberally to aid in building the roads. From this endeavor, through their emissaries, they will seek to rule the government itself; but the viper thus cherished and now venturing from its concealment, has been discovered.

MERCHANT.

The shops of the Empire Line, in Erie, Pa., repair about 100 cars daily.

Special Notices

Francisco Commercial Herald, in its annual review, dated January 30, prints the following statistics of the Lead shipments during 1878:

To	Tons.	Value.
New York.....	11,027	\$902,378
China.....	4,775	393,808
Japan.....	36	27,700
Victoria.....	32	2,987
England, &c.....	147	25,027
Totals.....	16,341	\$1,351,900

Shipments to Atlantic ports via Panama during 1878:

	Pounds.	Value.
Antimony.....	77,184	\$6,555
Lead.....	10,417,378	402,871
Silver ore.....	845,475	267,978
Base silver bullion.....	1,250,165	1,250,165
Total.....	12,548,102	\$1,927,569

Spelter and Zinc.—Common Domestic Spelter has become excessively dull again, and none but trifling sales have transpired. We quote the same nominally, $4\frac{1}{2}\phi$ @ $4\frac{1}{2}\phi$; Refined, $8\frac{1}{2}\phi$ @ $8\frac{1}{2}\phi$; Bergenport, from Lehigh ore, 9ϕ , and Silesian, $5\frac{1}{2}\phi$. The following is from London, dated January 25: "There is but a limited demand and sales are very few, Hard being procurable below $\pounds 12\frac{1}{2}$ ton." American Sheet Zinc is worth $6\frac{1}{2}\phi$.

Nickel.—No change has taken place: the demand is moderate, on the basis of $\pounds 1.25$ for Wharton's.

Antimony.—Remains inactive at $11\frac{1}{2}\phi$. @ $12\frac{1}{2}\phi$, according to quantity and brand.

EXPORTS

Of Hardware, Iron, Machinery, Metals, &c., from the Port of New York, for the Week ending Feb. 11, 1879:

Christiania.	Quan. Value.
Pumps, pkgs., 3	\$100
Ag. imp. pkgs., 70	3,666
Hdw. cs., 30	216
Sec'd ware, cs., 3	379

Rotterdam.	Quan. Value.
Petlm., gals., 256,300	300

Antwerp.	Quan. Value.
Ag. imp. pkgs., 3	250
Glassware, cs., 3	85

Hamburg.	Quan. Value.
Revolvers, 4	1,318
Copper, cs., 15	3,405
Pt'd ware, cs., 154	1,310
Ag. imp. pkgs., 7	1,310
Sew. mach., cs., 27	435
Mach'y, cs., 15	1,720
Glassware, cs., 3	210
Kn't'g. ma., cs., 14	1,675
Tinware, cs., 0	310
Ag. imp. pkgs., 422	35,361
Windmill, 1	350
Be. ting. bales, 6	1,000
Brass, cs., 15	1,575
Guns, cs., 1	430
Wheels, bxs., 3	1,380
Wringers, bxs., 69	1,380

Bristol.	Quan. Value.
Mach'y, cs., 2	280

Bremen.	Quan. Value.
Mach'y, case, 1	130
Pt'm., gals., 250,000	24,720
Ag. imp. pkgs., 156	4,434
Nick'l h'drs., cs., 1	278
Glassware, cs., 1	120

Liverpool.	Quan. Value.
Hdw., cs., 72	3,809
Metal g'ds, cs., 16	2,547
Wringers, 40	800
Sew. mach., cs., 1,301	1,301
Pt'd ware, cs., 2	440
Mach'y, pkgs., 118	2,361
Ag. imp. pkgs., 27	255
Pistols, cs., 1	1,800
Silverware, cs., 1	1,200
Elect. p'nts, cs., 8	3,000

Hull.	Quan. Value.
Ag. imp. pkgs., 25	600
Hdw., cs., 15	444
Sew. mach., cs., 70	1,000
Metal g'ds, cs., 1	1,540

London.	Quan. Value.
Ag. imp. pkgs., 307	1,665
Mach'y, cs., 48	6,538
Hdw., cs., 6	2,165
Nails, cs., 8	160
Sew. mach., cs., 100	1,000
Pt'd ware, cs., 2	500
Car wheels, 4	18
Mf. iron, pkgs., 6	100
Glassware, cs., 43	744
Pumps, pkgs., 7	168
Oil stoves, cs., 3	78

Exeter.	Quan. Value.
Pt'm., gals., 48,772	7,803

Gibraltar.	Quan. Value.
Petlm., gals., 45,000	5,412

Glasgow.	Quan. Value.
Mach'y, cs., 6	860
Mf. iron, pkgs., 6	100
Beating, bales, 18	2,833
Guns, cs., 2	519
Hdw., cs., 9	347
Oil, bbls., 50	345
Needles, cs., 1	937

Haere.	Quan. Value.
Copper, casks, 186	44,400
Mach'y, cs., 44	2,325
Silverware, cs., 1	60
Pt'm., gals., 291,561	24,270
Brit. ware, cs., 3	380
Hardware, cs., 5	108
Ag. imp. pkgs., 52,624	52,624

Rouen.	Quan. Value.
Pt'm., gals., 192,853	16,393

Valencia.	Quan. Value.
Pt'm., gals., 140,673	16,800

Dutch West Indies.	Quan. Value.
Cutlery, cs., 7	70
Hardware, cs., 1	30

Danish West Indies.	Quan. Value.
Arms, cs., 8	254
Hdw., pkgs., 13	221
Pt'm., gals., 3,770	540
Sew. mach., cs., 3	30
Glassware, pkgs., 125	400
Nails, cs., 40	123

Marselles.	Quan. Value.
Sew. mach., cs., 101	1,287

Bilboa.	Quan. Value.
Pt'm., gals., 131,326	11,400

Cadix.	Quan. Value.
Mf. iron, pkgs., 130	1,791
Sew. mach., cs., 11	190
Nails, cs., 8	275
Glassware, pkgs., 17	326
Grindstones, 120	57
Coal, tons, 1724	5,465
R. R. rails, pgs., 162	10,321
Iron, safe, 1	2,182
Mach'y, pkgs., 31	480
Nails, cs., 256	653
Hdw., pkgs., 308	3,548
Ag. imp. pkgs., 3	122
Mach. oil, gals., 1090	684

Alexandria.	Quan. Value.
Pt'm., gals., 121,000	14,600

Africa.	Quan. Value.
Pt'm., gals., 245,000	29,400

IMPORTS

Of Hardware, Iron, Steel and Metals into the Port of New York, for the Week ending Feb. 11, 1879:

Hardware.	Quan. Value.
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Baldwin Bros. & Co.	Quan. Value.
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Durckink W. C.	Quan. Value.
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Mds., pkgs., 5	Quan. Value.
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Hermann, H. & Co.	Quan. Value.
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Hopkins E. T.	Quan. Value.
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Mds., pkgs., 36	Quan. Value.
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May C. W.	Quan. Value.
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Arms, case, 1	Quan. Value.
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McCoy & Co.	Quan. Value.
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Mds., pkgs., 8	Quan. Value.
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Moore's J. F. Sons	Quan. Value.
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Mds., pkgs., 4	Quan. Value.
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Noyes, Smith & Co.	Quan. Value.
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Mds., pkgs., 2	Quan. Value.
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Peters Bros.	Quan. Value.
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Mds., pkgs., 2	Quan. Value.
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Schoverling & Daly,	Quan. Value.
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Arms, cs., 11	Quan. Value.
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Spies, Kinsam & Co.	Quan. Value.
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Arms, cs., 7	Quan. Value.
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Struller, Lau & Co.	Quan. Value.
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Arms, cs., 2	Quan. Value.
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Wetzlar M.	Quan. Value.
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Mds., pkgs., 2	Quan. Value.
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Wiebusch & Hilger Hdw.	Quan. Value.
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Cutlery and Hdw.,	Quan. Value.
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John G. & Bro.	Quan. Value.
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Mds., pkgs., 16	Quan. Value.
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Von Cleff & Co.	Quan. Value.
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Whetstones, cs., 10	Quan. Value.
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Boker Hermann & Co.	Quan. Value.
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Hdw., cs., 19	Quan. Value.
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Hdw., cs., 3	Quan. Value.
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Antimony, cs., 25	Quan. Value.
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COAL.

The state of the market during the past week presents few points of interest worthy of note. The mild weather has prevented any considerable demand from the retail dealers, although the general demand for domestic use seems to have been fairly good. Chestnut has been scarce, and there is great delay in obtaining it. The amount coming forward is exceedingly small, and is all sold far in advance. The quantity of other sizes coming to market is good, and some of the roads are reported as being far in advance of their usual tonnage. Others are supposed to be bringing down about half of the amount they usually carry. The result of this is, that the larger sizes are rather a drug in the market, and are selling at all sorts of rates, depending upon the man, his means, his character as a merchant and a dozen other things. The determination of the dealer to sell is strong, and if a man wants Coal he is very likely to obtain it no matter what his circumstances may be. In general, prices are supposed to be about the same as those of the auction sale. Eastern markets are very bare of Coal, and on account of very high freights not much Coal is going in that direction. Boston is quoted at $\pounds 1.50$, and other ports in proportion, and naturally only Coal enough is shipped to supply immediate and pressing necessities. It is hardly probable that such rates can continue for any length of time, and with lower freights we may expect a brisk Eastern demand.

OLD METALS, PAPER STOCK, &c.

Lead and Newspapers are about the only stock moving in this market since last week. In other articles we have no material change to report.

The purchasing prices offered by dealers for Old Metals are as follows:

Copper, heavy.....	per lb. \$.	@
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Copper Bottoms.....	per lb. \$.	@
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Yellow Metal.....	per lb. \$.	@
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Brass, heavy.....	per lb. \$.	@
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Brass, light.....	per lb. \$.	@
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Composition, heavy.....	per lb. \$.	@
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Lead, solid.....	per lb. \$.	@
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Tea Lead.....	per lb. \$.	@
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Zinc.....	per lb. \$.	@
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Pewter, No. 1.....	per lb. \$.	@
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Pewter, No. 2.....	per lb. \$.	@
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Wrought Iron.....	per lb. \$.	@
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Light do.....	per lb. \$.	@
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Stove Plate.....	per lb. \$.	@
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Machinery do.....	per lb. \$.	@
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Grate Bars.....	per lb. \$.	@
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The prices current for Rags, &c., are as follows:		
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Canvas, Linen.....	per lb. \$.	@
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White Cotton, No. 1.....	per lb. \$.	@
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White, No. 2.....	per lb. \$.	@
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No. 2.....	per lb. \$.	@
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Seconds.....	per lb. \$.	@
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Mixed, Woolen.....	per lb. \$.	@
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Soft.....	per lb. \$.	@
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Gunny bagging.....	per lb. \$.	@
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Juste butts.....	per lb. \$.	@
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Kentucky bagging.....	per lb. \$.	@
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Book Stock.....	per lb. \$.	@
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Newspapers.....	per lb. \$.	@
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Waste Paper and Scraps.....	per lb. \$.	@
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Kentucky Bale Rope.....	per lb. \$.	@
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Tarred Shaking.....	per lb. \$.	@
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Grass Rope.....	per lb. \$.	@
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Messrs. Du Plaine & Co., Philadelphia,		
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quote the market prices for Old Metals as follows:		
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Heavy Old Copper.....	per lb. \$.	@
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Light Tinned Copper.....	per lb. \$.	@
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Copper Bottoms.....	per lb. \$.	@
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Mixed, Woolen.....	per lb. \$.	@
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Heavy Red Brass Scrap.....	per lb. \$.	@
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Light Red Brass Scrap.....	per lb. \$.	@
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Light Yellow Brass Scrap.....	per lb. \$.	@
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Old Lead Pipe.....	per lb. \$.	@
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Old Junk Lead (melted in mass).....	per lb. \$.	@
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Tea Lead.....	per lb. \$.	@
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New Zinc Clippings.....	per lb. \$.	@
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Old Scrap Zinc.....	per lb. \$.	@
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Old Battery Zinc.....	per lb. \$.	@
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Plumbers' Lead Joints.....	per lb. \$.	@
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No. 1 Pewter.....	per lb. \$.	@
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No. 2 Pewter.....	per lb. \$.	@
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Old Type Metal.....	per lb. \$.	@
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Red Brass Turnings.....	per lb. \$.	@
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Yellow Brass Turnings.....	per lb. \$.	@
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Spelter Dross.....	per lb. \$.	@
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Lead Dross.....	per lb. \$.	@
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Stereotype or Electrotype Plates.....	per lb. \$.	@
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PHILADELPHIA.

Office of The Iron Age, 320 South Fourth St. PHILADELPHIA, Feb. 11, 1879.

The general condition of business continues to show signs of a healthy reaction, and in nearly all the leading manufacturing establishments there is a considerable amount of work going on. The activity is more widely distributed than we have seen during the past three years, and it is not at all unusual to find large establishments working overtime, while nearly all are on full time. These remarks apply to the Iron interests in all departments, with but one or two slight exceptions. The Baldwin L

have been quiet, although the French dealers are said to be speculatively buying up copper. The *Ironmonger* reports: "Copper has been dull and quiet throughout the week, the demand here having been but limited. On Saturday a cargo of Chili ore and regulus sold at 10/6 @ 11/, respectively, per unit. On Monday part of a cargo of New Quebrada went off at 10/9. Chili bars opened on the week at £57, cash; Wallaroo, £67, and Burra, £67. 10/. These figures are now 10/ @ £1 weaker. At the Swansea ticketing on Tuesday 1281 tons of ores sold at 10/6½ per unit for 15½ per cent produce—a total gross value being realized of £10,475. At next week's public sale there will be offered 797 tons Wallaroo cake and 56 tons ingots; 120 tons Burra cake and 100

purchases until the advent of spring. The late severe weather has stopped builders' operations, besides rendering farming impossible

tors' ingots. Tin has also been quiet, opening at \$59.15 for fine foreign, and \$63 to \$65.10 for English ingots. These rates have been shaded to the extent of 10¢ @ 15¢ during the week. There have been imported 2331 slabs from Penang in the Orestes. Tin plates are still in good request, and makers are quite firm in their quotations, which range from 15¢ upward. The United States market is continuing its previously reported large purchases. With France a fair business is being done, but native competition there is fast assuming tangible proportions. Lead is unchanged, with slow sales at \$14 @ \$15 for English pig, and \$13.17 for soft Spanish without lead. Sheet, pipe, &c., qualities are similarly weak. Spelter is nominally \$16.50 for ordinary English; Quicksilver, \$6.50 the bottle; and Antimony, \$47 for French star.

The official report of the London Metal Exchange was: "Copper.—Quiet; G. O. B. Chili bars, \$56.10; Wallaroo, \$66; Burra, \$64; English tough, \$61.10 @ \$62.10; best selected, \$62.10 @ \$63.10; strong sheets, \$67. Tin.—Unchanged; fine foreign, \$59.10 @ \$59.15; spot; English ingots, \$63. Iron.—Scotch pigs, 42/5, cash. Lead.—Dull; English pig, \$13.17 @ \$14.2/6; soft Spanish, without silver, \$13.15. Spelter, \$16.50 for ordinary brands. Zinc.—No quotations. Quicksilver, \$6.50. Antimony, \$47."

FOREIGN.

FRANCE.

(Moniteur des Interests Matérielles.)

PARIS, Jan. 22, 1879.—Metals.—Business in metals is picking up slowly. Copper.—The market has been quiet, with a fresh decline of 1 franc in Chili Bars and 2 francs in Ingots and Best Selected. We quote: Chili Bars, 156.50 francs the 100 kilos; Common ditto, 151.50; Ingots and Slabs, 155; Best Selected, 160; Corroded Ore, 160; Sheathing, 180; and Yellow Metal ditto, 175. Copper is nominal at Havre, where they quote first brands Chili Bars 152.50; good current ditto, 150.50; and Lota and Urmeneta, 147.50. Paris conditions. This shows a decline on the whole line. Marseilles reports weak market and a 5 franc decline on Refined Ingots. They quote small Refined Ingots 180; Sheet Copper, 180; Sheathing, 185; Bolts, 190; and Yellow Metal Sheathing, 175. Tin.—Quite a breakdown has occurred here. We quote: Banca, 170 francs the 100 kilos; Billiton, 167.50; Straits, 161.50; Australian, 161.50; and English, at Havre or Rouen, 162.50. The foregoing quotations show a decline for the week of 7.50 francs in Banca, 5 francs in Billiton, 3.50 in Straits and Australian and 4.25 in English. Marseilles has given way 2 francs in English Tin and 1 franc in other sorts. They quote: Banca, 165; Straits, 160; French, 170; and English, 167. Lead is weak and has yielded 25¢ on all sorts. We quote here, all kinds, 37.25 francs the 100 kilos; at Havre, 36.75; Manufactures, 36. Havre has dropped 50¢, 61 franc. They quote First Fusion Soft Spanish, 37.50 @ 38. Marseilles is also upheld with some difficulty. Spanish has been sold as low as 34 francs. They quote: Argenteuil, 36; First Fusion Soft, 35 @ 35.50; Second ditto, 35; Sheet and Pipe, 40; and Shot, 40.50. Spelter.—A decline of 50¢ for the week is reported in this market. We quote Silesian, deliverable at Havre, 43.50; at Paris, 44; Vieille Montagne Sheet Zinc, 61; Royal Asturian, 60; and Blanche St. Waast, 58. Havre quotes Silesian, 43 @ 44. Marseilles is 1.50 francs lower. They quote Vieille Sheet Zinc, 55; other brands, 52; and Old Remelted, 50. Old Bronze Metal has given way 5 francs there, and Old Iron has improved 50¢. Iron.—The slight revival alluded to in our last report has even assumed wider proportions, and a great many orders are dropping in. Iron Pipe and Wrought Iron are doing well; Tube for heating is in least request. In the Ardennes there is not much activity except in Nails, which continue wanted. Architectural Iron is moving off in small lots. Hollow-ware is neglected. In the Haute Marne there is still a quiet state of affairs, but makers decline naming prices for long-winded contracts. Nails are inactive; Chains are in active request for immediate delivery. A moderate amount of business is transacting at the North, but producers evidently feel confident as to the future, and decline making contracts ahead, except they are based on conditional differences in price up or down. This seems to us the best plan. The Nail trade in this district is suffering from a lack of export orders. Machine Horse-shoes are being consumed in increasing quantities in this region, and in order to stimulate sales, makers are accepting very reasonable figures for them. There is little doing in the Rhone and Loire, and people there are getting restless under this prolonged dullness. The shares of works in this region are offering and selling at low rates. In the Tarn district there is a rumor that the St. Albans works and mines will resume work.

BELGIUM.

(Revue Universelle.)

BRUSSELS, Jan. 22, 1879.—Iron.—The outlook in this country, instead of improving, is getting worse, and after four rolling mills have stopped operations in the Charleroi Basin, and two blast furnaces have been blown out in the same region, alluded to in previous reports, the strikes are now upon us. At the Esperance Works 200 workmen have refused to submit to a reduction of wages, and have struck work in consequence. At the Providence forges it is proposed that wages be lowered 15 per cent., but the workmen will subscribe to a 5 per cent. reduction only. Producers evidently have no choice but to reduce salaries. They have first cut down the output, subsequently a great many works ceased operations, but all this has been of no avail, prices declining steadily and sales dwindling down to a mere trifle, despite the low rates ruling. This places the small works in a poor plight; the financially powerful and large concerns come in for a large share in the government adjudications by being content to work without profit, but the small concerns are left in the cold and struggle in against hope. Under these circumstances we shall be glad if the plan frequently hinted at by us of introducing more generally iron sleepers should be adopted. The State Railroads take the lead in this matter and will require 4500 tons thereof under adjudication by Feb. 12.

GERMANY.

(Borsenhalle.)

HAMBURG, Jan. 22, 1879.—Metals.—The first three weeks of the year have been remarkably quiet, due to a measure to economical questions now agitating commercial circles in Germany and much discussed among people in the metal line. Copper.—Very little has transpired and prices have undergone no further change here and Stettin, while Berlin quotes Mansfield, 60 @ 60.50 marks the 50 kilos, and English and Australian, 63 @ 63. Tin.—This metal has been quite weak. No decline has, however, taken place here and at Stettin, but Berlin quotes Banca, 60.50 @ 70, and English, 67 @ 67.50. Lead has been slightly looking up, and notwithstanding here and at Stettin, Berlin has improved and quotes as follows: Tarnowitz, Hartz and Saxonia, 14.50 @ 14.75 marks the 50 kilos. Spelter.—Dealings in this metal are still restricted to comparatively small amounts, and we shall have to wait for another month ere much of a revival may be expected. Meanwhile prices, especially for desirable brands, remain steady on the basis of 16.75 @ 17.50 marks the 50 kilos at Berlin. No quotation has reached us from Breslau, where there is a total absence of business, and prices are nominal in consequence. No change can be reported either from this market or Stettin, and we repeat former quotations.

HOLLAND.

(Koch & Viterbo.)

ROTTERDAM, Jan. 18, 1879.—Tin.—The decline in this metal has been further progress. Banca has dropped from 37.50 guilders the 50 kilos, to 36.75, at which figure there continue to be sellers. Hardly anything transpires in Billiton, nominally

held at 36 guilders. It could, we believe, be bought at 35.75. The great dullness is due in part to the company's sale to come off Jan. 28, people preferring to await its result.

EAST INDIES.

(Schmidt, Kustermann & Co.)

PENANG, Dec. 14, 1878.—Tin has been neglected the greater part of the fortnight, and prices have declined rather precipitately from \$18.50 @ \$19.00 to \$8. Meanwhile more favorable advices have dropped in from London, and exchange has become favorable to exporters, causing a more lively demand toward the close and a rebound to \$18.50. Sales for the fortnight run up 7500 piculs, 6500 of which for Europe and the rest for China. Stock in bazaar, 6000 piculs.

CHINA.

(Arnhold, Karberg & Co.)

CANTON, Dec. 20, 1878.—Cotton continues, in spite of favorable statistics, to be neglected, and we have to report a decline of values for all qualities. Both dealers and consumers appear to be fairly supplied, and it is difficult to say how long they may be able to abstain from buying and thereby depress the market. The general opinion, based on the small supplies on the way, however, continues in favor of an early improvement. We quote English, \$8 @ \$8.25, and Australian, \$6.75 @ \$7.50.

INDUSTRIAL ITEMS.

MAINE.

Wood, Bishop & Co.'s stove foundry, in Bangor, has resumed work.

NEW HAMPSHIRE.

It is understood that a company has been formed for the introduction of the Holly system of heating into Manchester. The stock, \$50,000, has nearly all been subscribed, and the company is preparing to begin operations at once.

MASSACHUSETTS.

A number of hands were discharged from Smith & Wesson's shops at Springfield recently, and the force will be kept for the present at about 300. The principal reasons for the reduction are that some branches of the work are way ahead of others. The firm turn out now a total daily production of 250 revolvers.

The Lowell Machine Shop has changed its running time from three-fourths to four-fifths time, by reason of an increase in business. The foundry is running full time.

CONNECTICUT.

The Howe Sewing Machine Company at Bridgeport, commenced running ten hours per day on Monday last. They have been running eight hours since the holidays.

Sharps Rifle Company have recently received, through the Austrian Ambassador at Washington, the great gold medal of the Austro-Hungarian empire, which was sent them by His Majesty the Emperor as a token of his high appreciation of the merits of samples of the Sharps company's productions, furnished to the Austrian Government. The medal is of large size, of solid gold, and is very beautiful in design and execution and has considerable intrinsic value.

At the annual meeting of the Peck, Stow & Wilcox Company, held on Tuesday, the 28th ult., the old board of directors were elected with the exception of MacKenzie, vice L. O. Neal, deceased. The reports showed the financial affairs of the company to be in a very prosperous condition. A committee was appointed to take into consideration and report upon the best methods of protecting the property of the company against the risks by fire.

The Richmond Stove Company, of Norwich, began January 1 to run on full time. This became necessary, as their orders were ahead of the supply. They now employ seventy hands, or nearly their full capacity.

NEW YORK.

The Washburne Fluter, manufactured by P. E. Washburne, Buffalo, is the largest made, the roll being 2 1/2 inches in diameter and 3 inches long. It is full nickel plated and polished, and has two heaters. Mr. Washburne has also special facilities for making gray iron castings, and all kinds of plating in nickel, gold, silver and bronze; also every description of stove trimmings, brass finishing, patterns, models, hardware and light machinery. He reports an active and increasing demand for fluting machines.

Messrs. E. & B. Holmes of Buffalo, manufacturers of stove, barrel and keg machinery, have rebuilt their works, which were destroyed by fire last year. Their present works consist of a building 45 by 152 feet, four stories high, with an addition of 35 by 60 feet. They have introduced the most modern machinery, one lathe alone having cost \$6000. Their machinery is in successful operation all over the United States, and they have exported largely to Europe.

It is said there is some prospect that the Niagara River Iron Company's furnace at Tonawanda will go in blast next summer.

Newton & Co., of Albany, have achieved an excellent reputation in the manufacture of fire-brick and stove linings, and now claim to furnish better stove linings and brick than ever, at no increase in cost. Stove linings are their great specialty, although brick are produced in large quantities. Their products are taken East and West, even in California, and are sent to Europe, Australia, the Sandwich Islands and other places abroad. Their transactions are generally for large quantities, foundries being principally supplied.

NEW JERSEY.

Bayonne promises speedily to become a large manufacturing center for various interests. A purchase of 30 acres on the water front, by Martin Kalbfleish's Sons, has been improved by a large outlay of capital, so that the manufacture of chemicals will commence there in a few weeks, in expectation of a gradual transfer from the old location in Bushwick, L. I. The Standard Oil Works are also investing heavily in enlargements, and Chas. Pratt, whose refinery is at Hunter's Point, is reported to have recently purchased 15 or 20 acres at the same locality. A merging of interests by the two parties last named is also spoken of.

NEW JERSEY.

The rolling mill at Paterson has resumed operations. This mill, it will be remembered, was destroyed by fire last year.

DELAWARE.

Hugh E. Steele & Son, formerly of the

Laurel Iron Works, Coatsville, Pa., have rented the New Castle Rolling Mill from Morris, Tasker & Co., and on Wednesday last moved about 80 of their men to New Castle, and are preparing to put the mill in active operation. They will probably get started in about 10 days.

PENNSYLVANIA.

The new year has brought to the Baldwin Works a good influx of orders. Among them are six narrow-gauge locomotives for the Baturite Railway, of Ceara, Brazil, 17 for the New York Elevated Railroad, and scattering orders from the Canadian Pacific, Missouri Pacific, Oregon and California and Macon and Brunswick Railroads.

The Pennsylvania Tack Works at Norristown, were partially destroyed, shortly before midnight on Sunday, by an incendiary fire. A number of valuable tack machines were either ruined or badly damaged, and a large amount of packing material destroyed. The stock and building were insured for \$60,000.

On Wednesday, the 29th ult., for the first time, the Phoenix Iron Company illuminated their machine shop with the electric light. They have one 6-light Brush machine now in, and expect to have a second machine in operation shortly.

The Harrisburg Car Company having received, in addition to the last contract, an order for 100 coal cars (gondolas), propose constructing six cars per day, and working their hands nine hours.

There are various rumors afloat to the effect that the Greenville Rolling Mill will start up at once, and numerous "notes of preparation" give credence to that belief.—*Mercur Dispatch.*

The Lebanon Manufacturing Company have secured a contract for the construction of as many horse cars as they are capable of building, from this time forward until March.

The rolling mill at Scottdale still remains idle. The blast furnace continues in blast.

"Tubal Cain," in the Sharon Herald of the 7th inst., says: In Sharon, for the week ending Feb. 1.—At the Old Mill, puddle, guide and hoop mills double turn; bar and sheet mills, single turn; plate mill and nail factory, off; chain factory still working off, as usual; all fires going. A new enterprise has been started at these works—we mean the washer factory. It went on last week one and a half turn, with orders enough ahead to keep on that time until next July. At the New Mill, same as last week, with no particular change to note; everything running smoothly and likely to remain so. At Middlesex, six furnaces on; stopped two days on account of high water. Mr. Bradley tried his steel manufacture last week, but does not seem to have been successful. In Sharpsville, some trouble is being had at Mount Hickory. It is a difficult matter to start up a furnace that has stood time ratchet as long as this one has. The Old Mill, in New Castle, went on Monday last, the men agreeing to take white money for four months.

The Phoenix Iron Company have at work now over 2000 men, so that the wages paid fortnightly, provided they average \$2 a day, which, it is said, they do, will amount to \$48,000, or \$96,000 per month.

PITTSBURGH AND VICINITY.

D. W. C. Carroll & Co., of the Fort Pitt Steam Boiler Works, are working up to their full capacity in all departments. The firm report frequent inquiries from abroad for lighters, propellers, &c., in a finished condition.

The nail mill and factory of Shoenberger & Co., has been stopped since January 25 for the purpose of putting in a new engine. This will be done by February 10th or 15th, and the works will again resume operations.

Mr. Thomas M. Carnegie has been appointed chairman pro tem. of the Edgar Thomson Steel Company, Limited, to fill the vacancy caused by the death of Mr. David McCandless.

Brown's Mill, Pittsburgh, is running full in all departments.

Wm. Clark & Co., Solar Iron Works, Pittsburgh, are rapidly filling up their mill with workmen, most of the furnaces being on last Monday. They expect to be on full in a few days.

The case of Seaman, Young & Sleeth vs. Jones & Laughlins, which has been on trial several days, in Common Pleas No. 2, at Pittsburgh, is a suit for \$20,000 damages. The plaintiffs hold the patent for Seaman's rolls, and claim that the defendants have sent out a circular injurious to their patent.

MARYLAND.

There will be put into operation at once, at the Baltimore and Ohio Railroad rolling mill, at Cumberland, four additional furnaces in the puddle mill, all of them being double. Two furnaces will also be started in the bar mill. Ten additional puddlers and helpers will be employed, making, with other assistants, about 25 more hands than the mill is now working.

OHIO.

The Eagle Machine Works, Bucyrus, manufacturers of double, single and portable saw-mills, report business as excellent. They have now under contract four saw-mills, the machinery for the Nevada Bending Company, one bolting saw-mill, two portable 10 and 12-horse-power engines, and two Siamese-twins duplex engines.

The Iron Era says: The Lawrence mill has started up, having had her engine put into thorough repair. The Belfont mill is on full time.

The Jefferson Iron Works, at Steubenville, are on full. The nail factory is being run to its full capacity.

The Beuster Steam Wire and Iron Works, at Toledo, have been established for four years. They shipped recently a large job of creasing for the new school-house at Massillon. They also have recently shipped a large lot of grooved iron-wire stall guards to Tennessee, and have a contract on hand for creasing the large jail at Delaware.

A correspondent, writing from Martin's Ferry, gives the following information regarding the industries at that place: Business is much better in this town than heretofore. The Buckeye Glass Company's large factory presents a busy scene. They have plenty of orders. The large cooper shops of Park & Means, which were destroyed by fire, are rebuilt of fire-proof materials.

The iron roof, built by Pittsburgh parties at a cost of \$1750, is a model of neatness and strength. This firm will commence making barrels in a few days. The Laughlin Nail Company's mill makes good time, and there appears to be no difficulty in disposing of all the nails that can be made. L. Spence's large thrashing-machine works are running to their full capacity, preparing for the coming season. The thrashing-machine shop of E. J. Hoyle & Brother is also in full operation. These two works had a very successful season the past year. H. Woodward, manufacturer of picks and rakes, has also some orders. Thomas G. Culbertson's foundry is kept busy on heavy castings for the mills and blast furnaces in this vicinity. The foundry of Spence, Baggs & Co. is running, and can report a very good supply of orders.

Messrs. McGowan & Bliss, Cincinnati, are manufacturing 40 hydraulic presses for Wilson & McCallay, tobacco manufacturers, of Middletown. Besides these, they are quite busy on orders for machinery of various kinds, including their hydraulic pumps, for which they have several new orders.

The Iron Clad Paint Company, of Cleveland, last month sold to Barney & Smith Manufacturing Company, of Dayton, a carload of 20,439 pounds of dry Rosette iron clad paint; also a carload of 20,909 pounds to parties in St. Louis, besides filling orders for several railroads. They have also filled orders for the Keystone Bridge Company, of Pittsburgh, Pa. This company sold more paint in January, 1879, than it has ever sold in January and February of any previous year for the past 10 years. This is evidence that trade is reviving, and that the iron clad paint is known and appreciated.

The furnace of the Girard Iron Company is in full operation. It has been in blast for over 19 months, and will still run for some time yet.

James Ward, of Niles, was granted a discharge in bankruptcy in the United States Circuit Court at Cleveland.

The employees of the White Sewing Machine Company, Cleveland, are about 400 in number. This firm at present is turning out 900 machines per week.

The Cleveland Foundry, Bowler, Mahar & Brayton, proprietors, has at present all the work on hand that can be attended to.

The Cleveland Rolling Mill Company have about completed essential repairs at their extensive works, and a general resumption of business is anticipated soon in all the departments.

The Cuyahoga Furnace Company employ 62 workmen. This company formerly gave steady employment to about 200.

Bourne & Knowles employ 45 men at their nut and washer works on Main street, Cleveland.

The Forest City Spring Company have 60 men and boys engaged at their works at Cleveland.

The Supreme Court of Ohio has granted a writ of quo warranto in the case of Brown, Bonnell & Co., and thus the whole question as to the legality of the late election will be brought before that body.

The North American Cutlery Company, of Painesville, have been incorporated, with a capital stock of \$30,000.

The Cleveland Rubber Co. are so driven with orders that they have been compelled to put on a night force, being two months behind with their orders. These are principally for belting, but their orders for hose of all kinds are also larger than ever before at this time of the year. This company has machinery on the way from the East which will increase their capacity about one-eighth. They also contemplate building an addition to their works in the spring.

INDIANA.

Moore & Kerrick, Indianapolis, have connected a machine shop, iron and brass foundry with their establishment.

At Green Castle the nail mill and factory have been making full time since Jan. 6.

KENTUCKY.

The Princess Furnace has blown out for an indefinite period.

MICHIGAN.

President Pullman has sent an order to the company's shops, at Detroit, for the construction of eight palace sleeping cars, to embody all the latest improvements. Four of these will be used upon the London and Great Northern Railway, in England, and four upon the New York, Lake Erie and Western. The cars will cost \$14,000 apiece.

Tariff Allowances for Damage.

WASHINGTON, February 12.—The following circular has been issued by the Secretary of the Treasury to collectors of customs:

The regulations governing allowances for damage occurring to imported merchandise on the voyage of importation, are hereby amended as follows:

Articles 507 and 509, which require the concurrence of the general appraiser in the estimate of damage, are hereby repealed.

Article 511 is amended so as to read as follows: Allowance for damage can be made only after due claim and proof, and where the same is found by the examining officers, on actual inspection and examination, to be a substantial and actual damage received during the voyage of importation. If the articles be contained in a package, the package must be opened, in order that the extent of the actual damage may be ascertained. In the following classes of merchandise it may not be necessary, in order to properly appraise the damage, to require that each and every package of the merchandise shall be opened, but not less than ten per centum of such packages shall be opened, the opening of a greater number to be left to the discretion of the appraiser. Green and dried fruits in packages; sardines, pickles and other articles in sealed packages; pepper, pimento and mace, macaroni, soda-ash and caustic soda; sugar in mats or bags; rice in bags.

Of green fruit, not less than 10 per cent. of the packages of each marked on the invoice shall be opened and examined. Of sardines, pickles, sauces and other like varieties in sealed bottles, jars or cans, not less than 10 per cent. of the outer packages shall be opened and examined, but the num-

ber of bottles, jars, &c., which shall be opened is left to the discretion of the appraiser. Of the other articles mentioned, not less than 10 per cent. of the packages shall be opened, but the examination of a greater number is left to the judgment of the appraiser. In no case, however, will the selection of the packages to be opened be made by any other person than the officers of the appraiser's department. Sugar in packages and pepper in bags may be examined by taking proper samples from the packages by means of triers, where such mode of examination is practicable. (Extract from circular No. 129 of 1878.)

Articles 512 and 513 are hereby repealed, and the following is prescribed: If the importer be dissatisfied with the return of the appraiser, either as to the extent of damage or his action in refusing any allowance on account of failure to produce satisfactory proof of sound shipment, he may file a notice with the collector of such dissatisfaction and have a reappraisal by a merchant appraiser and general appraiser, as authorized by section 2928 of the revised statutes and the regulations prescribed for the re-appraisal of imports in Articles 422 to 428, inclusive. At the earliest day practicable after the receipt by the collector of the award of damage, he will cause notices of such award to be posted in a conspicuous place in the Custom House, and the 24 hours during which, under Article 420, a reappraisal may be demanded, will commence from the close of the day on which such notice is posted.

No reappraisal of damaged goods can be had except upon an actual inspection of the merchandise by the merchant and general appraiser, and care will be taken on such reappraisal to confine the award of damage to that actually occurring on the voyage of importation, without allowance for any damage which may have occurred after the landing of the goods in the United States. Article 519 is amended so as to read as follows:

Damage on the voyage of importation must be ascertained at the port where the vessel originally enters, and cannot be certified from any other port. The bill of lading may be accepted as prima facie evidence of sound shipment.

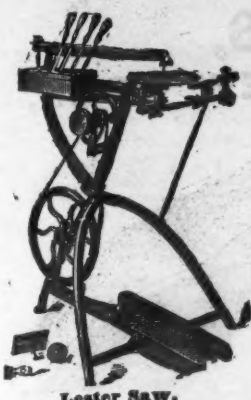
The completeness and interest of some of the American exhibits at Paris was a surprise to foreign newspaper correspondents. A writer in the *European Mail* of Jan. 9th thus describes the exhibit of A. Field & Sons, of Taunton, Mass.: As a general rule outsiders do not take any special notice of such dry and uninteresting matters as nails, tacks, or brads. It was, however, impossible to pass the exhibit of the Messrs. Field without stopping to inquire how the artistic effect was produced. You saw a full history of the works; its capacity, some 50,000,000; its extent, the entire length of the works, 700 feet; the number of varieties, no less than 2042; and the date of its foundation, 1827—all these particulars told in the products of the factory. There were tacks, copper, brass, tin, and iron, for carpets, brushes, and gimp; tacks, patent coated in colors, red, green, blue, drab, and maroon; lining, saddle and tufting nails; buttons for upholstery, glaziers' points, jappaned lining nails, common and patent brands, annealed trunk and clout, hob and Hungarian nails. In fine, there was not a single description of nail, tack, or brad, from the largest to the most microscopic, in every metal used for nails, in colors not seen before, that was not exhibited, either in the legend that told the story of the house or in the innumerable compartments of the glass stand that surrounded the exhibit. At the back was an admirable bird's-eye view of the factory, exceedingly unlike poor Artemus Ward's panorama, inasmuch that it is really excellent as a work of art. That the Messrs. Field obtained a silver medal is no marvel; the only wonder is that they did not gain what they fully merited—either the gold medal or a still higher honor. A more remarkable exhibit in its peculiar line—and I say this with a personal experience of all the international exhibitions—I never remember to have seen.

We are informed by the Spanish Consul in New York, in answer to inquiries, that under the official decree now in force, admitting machinery and cattle duty free into the "Districto Oriental," or late insurrectionary provinces of Cuba, a fair trade is in progress. The hope is that the fertile and once productive estates now lying in ruins, will recover more rapidly under the encouragement thus given; but as yet there is no decided improvement. In fact, as suggested by the assistant consul, time will be required by the impoverished planters in which to gather their feeble resources, and further time must elapse before orders for much new machinery can be given. Messrs. Ward & Co., of the Havana steamship line; also the Messrs. Owen, agents in South street, speak of trade at present as unusually dull. Considerable quantities of material for portable railways continue to go forward (for the week ending January 28 not less than 8000 packages, valued at \$81,825), also boilers, evaporating pans, &c., but nothing unusual; and as regards the "Districto Oriental," the latter have not yet received a single order, though inquiries are numerous. Sailing vessels doubtless afford superior facilities for direct shipments to Eastern Cuba; but steamers will be preferred when dispatch is necessary, as the railways extending from Havana to Eastern Cuba afford ample means of transportation on the island. As regards cattle, shipments are almost exclusively from Galveston and other ports in Texas.

The great manufacturing establishment for the Ansonia Clock Company, the largest of its kind in the world, is now so far advanced that the works will be opened for quite a time this coming spring, and nearly or quite at their full capacity. The building and machinery together will represent an investment of \$250,000. A Corliss engine of large power is in course of construction, and contracts for machinery, embracing tools of every description, are being executed by Pratt & Whitney, of Worcester, Mass., a company in Waterbury, Conn., and Messrs. Hart & Sloan.

Foot Power Bracket Saws

Are now so much in demand that some of them are being sold in almost every town in the United States. Many dealers are doing a profitable Christmas trade on such goods at a time of the year when other business is usually dull. The two Saws shown in these cuts are the ones most in demand. We advertise them as for sale at the hardware stores, and they will be called for. We make a fair discount to the trade.

LESTER SAW.

The New LESTER SAW is made of iron, with all the working parts of Steel, and contains ALL KNOWN IMPROVEMENTS to this date. It is handsomely painted red and green with red stripes, and presents a beautiful appearance. Those parts which are not painted are either polished or japanned. We warrant the Saw to be just as herein stated, and we know it will give entire satisfaction, being a more expensive machine than those which we formerly sold for \$25. It consists of a SCROLL SAW, with TILING Table for inlay work; arms 18 inches in the clear; clamps which will hold saws of any length or width, and face them in four different directions, cutting lumber from 1-16th to 1 inch in thickness; speed, 1000 strokes per minute. 2d. A CIRCULAR SAW 2 1/2 inches in diameter, which will cut lumber 3/4 inch and less; with an Iron Table 4 by 5 inches. 3d. A DRILLING ATTACHMENT with six Stub Steel Drills of various sizes for wood or iron work. 4th. An EMERY WHEEL, with wide and narrow rim. 5th. A TURNING LATHE, with Iron Ways and Rest, Steel Centres and three Best Steel Turning Tools; length of Ways, 15 inches; distance between Centres, 6 inches; swing, 1 inch; length of Slide Rest, 3 1/2 inches; number of revolutions per minute, 700. Also, with each Machine, six Saw Blades, a Wrench, Screw Driver, Extra Belt and two sheets of Designs, with a nice box for the small tools and a box for the whole machine. It is taken apart when shipped and packed in a box, but the working parts are all left in place and the frame is put together again by a single bolt.

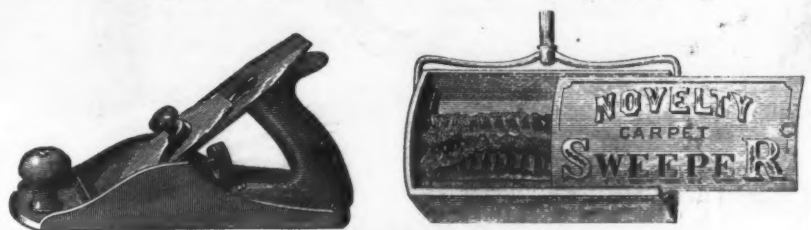
Price for everything above named, \$8.00
The same without the Lathe and Circular Saw, \$6.00
When desired, we furnish with the Lathe a very nice Drill Chuck for working metal, and a Tail Stock, with Screw Centre, for \$2.00 extra.

ROGERS SAW.

Scroll Sawing and Drilling Attachment. Iron Table, adjustable for inlaying. All the working parts of iron and steel; weight, with box, 30 pounds; height of table above the floor, 32 inches; 12-inch belt wheel; 5-inch balance wheel; arms 18 inches in the clear; latest improved clamps; round belt and wrench. The iron and steel parts are polished or japanned; the wood is painted dark. It is not as good as our Lester Saw, but is much better than any other cheap machine in the market.

Price, including all the attachments and the box, \$3.00

MILLERS FALLS CO., 74 Chambers St., New York.

BAILEY WRINGING MACHINE CO.,
No. 99 Chambers Street, New York.

Novelty and Excelsior Clothes Wringers,
Defiance Metallic Planes,
Spoke Shaves, Try Squares, etc.,
Novelty Carpet Sweepers.

MANUFACTURERS' AGENTS FOR
American Meat and Vegetable Choppers,
Silver's Stuffers and Presses,
Simpson's Quick-Adjusting Parallel Vises,
Novelty and Relief Washing Machines,
Domestic Ironing Mangles.



SPECIAL QUOTATIONS ON THE ABOVE GOODS FOR EXPORT.
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Brass Hooks for Jewelers' Cases, Zinc and Iron Hinges, Turn Buttons, Thumb Springs, Book Clasps, and Fancy Metal Work of all kinds.
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Sole Manufacturer of the

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Bit Braces,

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Borers,

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Straight

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&c.



Comprising every grade of quality and finish, from the cheapest Farmers' Brace to the finest Steel Sweep, heavily nickel plated, with rose-wood handles and lignum vitae heads, being the most complete line offered by any manufacturer in the country, and which for simplicity of construction and effectiveness have no equal. Catalogues and price lists furnished upon application at office and salesroom.

The Stamped Stove Pipe Elbow,
HOGEN'S PATENT.

The Stamped Elbow has neither Crimps, Cavities nor Angles which cause accumulations that rust or corrode the iron.

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MANUFACTURERS OF

FINISHED

(BRIGHT OR BLUED)



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VERGENNES, VT.
HORACE DURRIE & CO., Agents,
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PUTNAM'S HOT FORGED & HAMMER POINTED Horse Shoe Nails.

Made from the best of Norway Iron. The only hot forged machine made Horse Shoe Nail in the world that is not sheared or cut on the point. Warranted never to split or sever in the driving, and to hold the shoe longer than any other Nail. For sale by the hardware and iron trade generally.

PUTNAM NAIL CO.,
P. O. Address, Neponset, Mass. BOSTON.

ANVIL NAIL CO.

We desire to call the attention of the trade to our new manufacture of

Steel Horse Shoe Nails,

made from metal prepared in the Martin-Siemens Furnace by our PATENT process, which produces a nail having all the requisites for a

PERFECT HORSE SHOE NAIL.

The well-known desirable properties of a perfect nail are, that the POINT should be sharp, the SHANK stiff, to drive without crippling under the hammer, soft enough to clinch readily, while sufficiently tough to avoid all danger from the "drawing the clinch" or breaking the neck under the head. These properties we claim for the

"ANVIL HORSE NAILS."

In the process of manufacture the metal is compressed under the head, which gives the nail great strength where it is required (between the shoe and hoof), and the cold rolling gives it a stiffness attained in no other way, while the quality of the metal used insures a clinch and point unsurpassed by any nail ever offered in the market. Samples and prices sent on application.

ANVIL NAIL CO.,

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Scythe, Axe, Knife and Hacker STONES.

Factories at Haverhill and East Haverhill, N. H., and Evansville and Westmore, Vt.

Genuine OLD RELIABLE, INDIAN POND (Red Ends), LANTERN, DIAMOND GRIT, WHITE MOUNTAIN, PREMIUM, MOVING MACHINE, RAGG.

Some are written up and labeled in any style desired. PRICE AND QUALITY GUARANTEED. All the above Stones are of good keen grit and will not glaze.

Established in 1839.

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Manufacturers of L. Coes'

GENUINE IMPROVED AND MECHANICS

Patent Screw Wrenches

UNDER PATENTS DATED
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The back thrust when in use borne by the SHANK instead of the Hand's. None genuine unless stamped "L. COES & CO."

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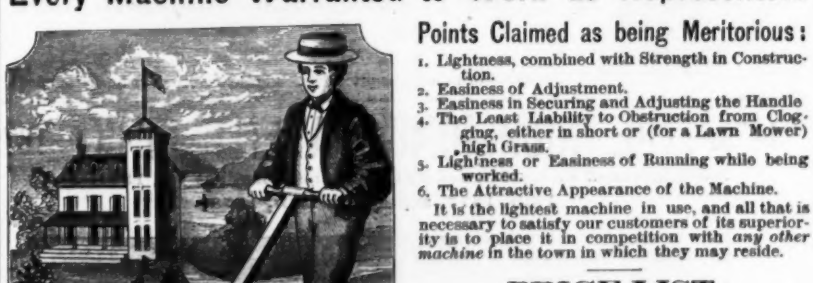


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Firth's Best English Cast Steel.

The 1879 Pennsylvania Lawn Mower.

LIGHT DRAFT AND EASILY ADJUSTED.
Every Machine Warranted to Work as Represented.



Points Claimed as being Meritorious:

1. Lightness, combined with Strength in Construction.
2. Ease of Adjustment.
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4. The Least Liability to Obstruction from Clogging, either in short or (for a Lawn Mower) high Grass.
5. Lightness or Ease of Running while being worked.
6. The Attractive Appearance of the Machine.

It is the lightest machine in use, and all that is necessary to satisfy our customers of its superiority is to place it in competition with any other machine in the town in which they may reside.

PRICE LIST.

Width of Cutter.	Style.	Driving Wheel.	Power required.	Weight.	Price.
10 inch.	"	"	A Child.	30 1/2 lbs.	\$14.00
12 "	"	"	A Lad.	33 1/2 "	18.00
14 "	"	"	A Lady.	36 "	20.00
16 "	"	"	One Man Size.	38 "	22.00
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NEW MACHINES.

15 inch, 10 1/2 inch Driving Wheels, 6 1/2 inch Cylinder, Man Size, 48 lbs.	\$28.00
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The Cheapest and only Sound, Low-Priced 22 Cal. in the Market.



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Using Smith & Wesson Cartridge.

Rubber Stock, Wrought Steel Frame, every part of the Best Material, and Finest Workmanship.



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A Stylish Line of Cheap, Octagon, Fluted Revolvers.

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Send for illustrated price lists. Please inclose your business cards.

1879.—THE RICHMOND PATENT SINK.—1879.

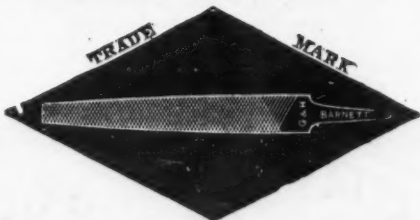
Manufactured under Letters Patent granted August 1st, 1871, June 19th, 1877, September 17th, 1878.



The patented hinged Strainer and bolted trap are peculiar to this sink. The trap is of simple construction, always in place, and as a sanitary precaution is invaluable, being an absolute protection against the escape of all poisonous gases. The castings are unsurpassed in smoothness and quality. All sizes are furnished with a galvanized portable soap dish, patented. Galvanized racks for draining dishes furnished when desired. Manufactured by

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Black Diamond File Works.



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Patent Extension Cylinder

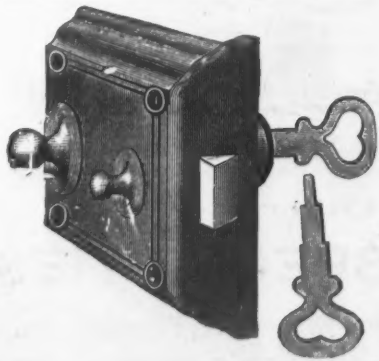
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For Doors 1 1/4 to 2 in.

Speaking Tube,
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IT IS SIMPLE, EFFICIENT, DURABLE.

The Stock and Gear Wheel are made of STEEL, in one solid piece, working parts all covered and protected; can be altered to a Boiler Ratchet in a few minutes, by having EXTRA SHORT STOCK, thus doing the work of TWO tools. Send for Circular and Price List to MANUFACTURERS,

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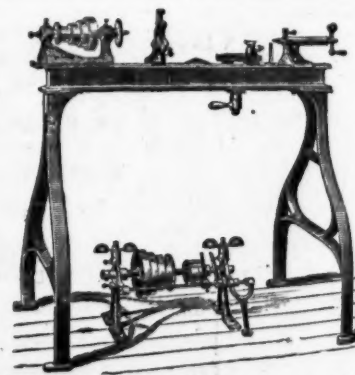
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Buck Bros., Millbury, Mass. 10 Checks. Cook James D., 40 Broadway, N. Y. 34 Clock Springs, etc., Manufacturers of. Cary & Moen, 24 W. 20th, N. Y. 3 Dunbar Bros., Bristol, Conn. 3 Clashes Pin (Hinge). Brower J. L. & Son, 285 Greenwich, N. Y. 34 Coal, Miners of. Farde & Co., 111 Broadway, N. Y. 6 Tennessee Coal and Coke Co., 28 West, N. Y. 6 The Hoboken Coal Co., Jersey City, N. J. 6 Coal Hods. Pierce Geo. N. & Co., Buffalo, N. Y. 24 Coal Vases. Shepard Sidney & Co., Buffalo, N. Y. 27 Coffee and Spice Mills. Lane Brothers, Millbrook, N. Y. 24 Enterprise Mfg. Co., Philadelphia, Pa. 23 Commission Merchants. Field Alfred & Co., Chambers, N. Y. 23 Compasses and Dividers, Manufacturers of. Smith & Call Hdw. & Tool Co., Springfield, Mass. 12 Coppers' Tools, etc., Manufacturers of. D. R. Barton Tool Co., Rochester, N. Y. 2 Copper. The New Haven Copper Co., 255 Pearl, N. Y. 2 Corn Huskers. Chambers, Boring & Quinlan, Decatur, Ill. 30 Corn Shellers. The Gouda Mfg. Co., Seneca Falls, N. Y. 30 Corrugated Iron. Koeley Iron Bridge and Roof Co., 4 Dey, N. Y. 35 Crucibles, Manufacturers of. Wile, Siegel & Co., 709 Market, Phila. 33 Cupolas & Blows. Smith & Sayre Mfg. Co., 21 Cortlandt st., N. Y. 36 Curry Combs, Manufacturers of. Lawrence Curry Comb Co., 32 2d av., N. Y. 36 Cutlery, Importers of. Boker Hermann & Co., 101 Duane, N. Y. 34 Clatworthy F. & W., 38 Chambers, N. Y. 10 Fisher Jos. S., 41 Commerce, Phila. 10 Friedmann & Co., 14 Warren, N. Y. 10 Cutlery, Manufacturers of. Burkshaw Aaron, Peppercorn, Mass. 10 Goodell Company, Andover, N. Y. 10 John Russell Cutlery Co., 92 Chambers, N. Y. 10 Marx Bros., 40 Broadway, N. Y. 10 Meriden Cutlery Co., 92 Chambers, N. Y. 10 Naugatuck Cutlery Co., 92 Chambers, N. Y. 10 Syracuse Cutlery Co., Syracuse, N. Y. 10 The Lanson & Goodnow Mfg. Co., 92 Chambers, N. Y. 10 Differential Pulley Blocks. Yale Lock Mfg. Co., 92 Chambers, N. Y. 3 Dinner Pail & Lanterns. Haight, Jos. Forchester, N. Y. 31 Discount Tables. Jennings & R., Deep River, Conn. 16 Dunne P. R., 125 Fulton, N. Y. 30 Van Wagner & Williams, 92 Beekman, N. Y. 30 Drilling Machines, Makers of. Thomsen, De. & Co., Philadelphia, Pa. 36 Wiley & Russell, Greenfield, Mass. 36 Drop Forgings. Rose Wm. & West Philadelphia, Pa. 36 Merrill C. & Sons, 156 Grand, N. Y. 36 Drops Hammers. The Siles & Parker Press Co., Middletown, Ct. 37 Drop Presses. Beecher & Fox, New Haven, Conn. 37 Edge Tools, Makers of. Cocher M., 96 Chambers, N. Y. 27 Greg M. & Co., 96 Chambers, N. Y. 27 The H. R. Barton Tool Co., Rochester, N. Y. 27 Elbows (Steam Pipe). Stamped Elbow Co., Cleveland, Ohio. 31 Elevators, Makers of. Crane Bros. Mfg. Co., Chicago, Ill. 9 Stokes & Parrish, Philadelphia, Pa. 9 Elevator Buckets. Rowland T. & Co., Brooklyn, N. Y. 35 Emery Wheels. Lehigh Valley Emery Wheel Co., Watsport, Pa. 38 Engineers, Machinists, etc. Southern States Coal, Iron & Land Co., South Pittsburg, Tenn. 6 Todd Joseph, 10 Harely, N. Y. 37 Engines, Gas. Schlicher, Schumm & Co., Philadelphia, Pa. 13</p>	<p>Engines (Locomotive). Baldwin Locomotive Works, Philadelphia, Pa. 6 Engines, Steam, Makers of. Ervin Chas. W. & Co., Kensington, Phila. 36 Tuck & Hovey, Indianapolis, Ind. 24 Harris Wm. A., Providence, R. I. 36 Lovegrove & Co., Philadelphia, Pa. 36 Payne & W. & Co., Pottsville, Pa. 36 Taylor & Boggie, Cleveland, O. 36 The Passaic Rolling Mill Co., Paterson, N. J. 36 U. S. Iron and Tin Plate Co., Pittsburgh, Pa. 36 Vulcan Iron and Nail Works, Chattanooga, Tenn. 36 Wason Car and Foundry Co., Chattanooga, Tenn. 36 Wood Allen & Co., 29 Arch, Philadelphia, Pa. 36 Zug & Co., Pittsburgh, Pa. 36 Export Factories. Jennings & R., Deep River, Conn. 16 Fan Blowers. Landis & F., Lancaster, Pa. 36 Faucets, Brass, Makers of. McKee & Parlin Mfg. Co., 45 John, N. Y. 32 Faucets, Wood. Penfield Block Works, Lockport, N. Y. 24 Faucets, Self-Measuring, Makers of. Enterprise Mfg. Co., 92 Chambers, N. Y. 3 Lane Bros., Millbrook, N. Y. 24 Fence (Hurdle). Wickham J. S., 913 Cherry, Philadelphia, Pa. 5 Filing, Importers of. Carr J. & Riley, 10 John, N. Y. 32 Fisher Joseph S., 41 Commerce, Phila. 10 Koss J. W., 10 John, N. Y. 32 Filing, Manufacturers of. Auburn File Works, Chambers, N. Y. 8 Barnett G. & H., 41 and 43 Richmond, Phila. 32 Plancher & Sons, Phila. 32 Draper C. T. & Co., Sing Sing, N. Y. 32 Everhart James M., Scranton, Pa. 32 Johnson & Bro., 1 Commerce, Phila. 32 McCaffrey & Bro., 175 and 177 N. 4th, Phila. 32 New American File Co., Philadelphia, Pa. 32 Nicholson File Co., Providence, R. I. 32 Paul Chas. R., Williamsburg, N. Y. 32 Schell John H., 1 Second St., Baltimore, Md. 32 Spencer I. R. & Son, Sheffield, England. 32 G. F. Stott, Rochester, N. Y. 32 Fire Brick, Makers of. Boring & Quinlan, Decatur, Ill. 30 Brooklyn Clay Refractory and Fire Brick Works, Van Dyke St., Brooklyn, N. Y. 13 Gardner Brothers, Pittsburgh, Pa. 13 Hall & Sons, Perth Amboy, N. J. 13 Hall & Sons, Buffalo, N. Y. 13 Maurer Henry, 48 East 2nd, N. Y. 13 Newton & Co., Albany, N. Y. 13 Valentine M. D. & Bro., Woodbridge, N. J. 13 Watson John R., Perth Amboy, N. J. 13 Fire Clay, Makers of. Baeder, Adamson & Co., 750 Market, Phila. 23 Fluting Machines. Shepard Hardware Co., Buffalo, N. Y. 23 Flutes, Manufacturers of. The American Machine Co., Philadelphia, Pa. 21 Forges, Portable, etc., Manufacturers of. Empire Portable Forge Co., Cohoes, N. Y. 23 Foundries, etc., Manufacturers of. Brown T. J., Rockwood, Tenn. 6 Foundry Castings. Tuck & Hovey, Indianapolis, Ind. 24 Whitehead Bros., 417 W. 15th, N. Y. 4 Friction Clutch. Smith James & Co., 137 Market Philadelphia, Pa. 34 France, Manufacturers of. Richmond & Potts, 118 S. Fourth, Phila. Pa. 4 France (Chambers). Madison John, Room 2, 15 South 7th, Phila. 4 Furniture Springs. Carey & Moen, 24 W. 20th, N. Y. 3 Haight Lloyd J., 51 John, N. Y. 3 Galvanized Iron. Lefferts Marshall, Jr., 90 Beekman, N. Y. 4 Gauges. Richards, Hand & Taylor, 2nd and Wood, Phila. 20 Governors. Judson James & Son, Rochester, N. Y. 37 Grindstones. Wood Walter R., 23 and 25 Front, N. Y. 31 Worthington & Sons, North Amherst, O. 31 Guns, etc. Scherling, Daly & Gales, 4 Chambers, N. Y. 22 Windmiller Louis & Reiker, 20 Reade, N. Y. 16 Gunpowder, Makers of. Knedland F. L. (DuPont) 70 Wall, N. Y. 30 Ladin & Rand Powder Co., 25 Murray, N. Y. 30 Handles, Makers of. Hundley & Hanks, 75 Reade, N. Y. 34 Hardware Commission Merchants. Graham & Haines, 113 Chambers, N. Y. 9 Hundley & Hanks, 75 Reade, N. Y. 34 Tannis & Wilson, 31 Beekman, N. Y. 8 Walbridge R. & Co., 51 Reade, N. Y. 27 Hardware Dealers. Lloyd, Supple & Walton, 65 Market, Phila. 21 Shepard Sidney & Co., Buffalo, N. Y. 27 Hardware Importers. Boker Hermann & Co., 101 Duane, N. Y. 34 McCoy & Co., 134 and 136 Duane, N. Y. 15 Windmiller Louis & Reiker, 20 Reade, N. Y. 16 Hardware Manufacturers. American Spring Steel Co., 32 Beekman, N. Y. 33 Coulter, Flagler & Co., 37 Chambers, N. Y. 33 Smith H. D. & Co., Plantersville, N. Y. 33 Dible Mfg. Co., Trenton, N. J. 33 Enterprise Mfg. Co., Phila. 23 Lloyd, Supple & Walton, 65 Market, Phila. 21 Mulvey & Co., 4 Reade, N. Y. 21 Miller & Sells Co., 74 Chambers, N. Y. 21 Chicago & Co., Chicago, Ill. 21 R. H. Mfg. Co., Pawtucket, R. I. 21 Russell & Erwin Mfg. Co., New York 21 Shepard Hardware Co., Buffalo, N. Y. 23 Stanley Works, New Britain, Conn. 12 Union Mfg. Co., 92 Chambers, N. Y. 38 Van Wagner & Williams, 92 Beekman, N. Y. 30 Hardware Specialties. Many Francis 143 Chambers, N. Y. 29 Shepard Sidney & Co., Buffalo, N. Y. 27 Spencer & Underhill, 4 Chambers, N. Y. 8 Hardware (Wagon). Covert E. & J. C., Farmer Village, N. Y. 24 Harness Saws. Covert Mfg. Co., Troy, N. Y. 24 Hay, Makers of. Holt Hiram & Co., East Wilton, Me. 34 Hinges. Lewis, Oliver & Phillips, Pittsburgh, Pa. 16 Stanley Works, New Britain, Conn. 12 Hog Ringers. Chambers, Boring & Quinlan, Decatur, Ill. 30 Holding Machines, Makers of. Mfg. Co., Chicago, Ill. 9 Davis J. & Co., Newark, N. J. 9 Mundy J. S., Newark, N. J. 9 Holding Machines. B. & A. Co., 312 Green, Phila. 12 Harrington Edwin & Son, Philadelphia, Pa. 30 Hollow Chilled Rolls. Totten & Co., Pittsburgh, Pa. 36 Hooks (Cotton & Hair). New York Hardware & Mallet Works, 45 E. Houston. 13 Horse Clippers. Boker Hermann & Co., 101 Duane, N. Y. 34 Shannon J. J., Philadelphia, Pa. 34 Horse Nails, Makers of. Anvil Nail Co., 55 Washington, N. Y. 21 Naugahorse Nail Co., W. W. W. 21 EP Horse Nail Co., Cleveland, O. 21 National Horse Nail Co., Vergennes, Vt. 21 Northwestern Horse Nail Co., Chicago, Ill. 21 Putnam Nail Co., Neponset, Mass. 21 Saranac Horse Nail Co., Plattsburg, N. Y. 21 Horse Shoes, Makers of. Boker Hermann & Co., 101 Duane, N. Y. 34 Rhode Island Horse Shoe Co., Providence, R. I. 30 Schoenberger & Co., Pittsburgh, Pa. 30 Hydrants, etc. McLean John, 30 Monroe, N. Y. 34 Mohawk & Hudson Mfg. Co., Watford, N. Y. 34 Hydraulic Jacks. Dudson Richard, 24 Columbia, N. Y. 31 Insurance, Boiler. Hartford Steam Boiler Inspection & Insurance Co. 37 Iron Brokers. Boynton Geo. A., 70 Wall, N. Y. 4 Collins H. & Co., Pittsburgh, Pa. 4 Etting Edward J., Philadelphia, Pa. 4 Harty & Friend, Pittsburgh, Pa. 4 Iron, Charcoal, Warm or Cold Blast. Quincy John W., 98 William, N. Y. 4 Iron Commission Merchants. Adams Hugh W., 25 Pine, N. Y. 6 Lowe S. B., Chatfield, N. Y. 6 Iron, Pig, Importers of. Williamson James & Co., 60 Wall, N. Y. 4 Iron, Manufacturers of. Abel Brothers, 100 South, N. Y. 4 Bonnell, Botsford & Co., Youngstown, O. 4 Borden & Lovell, 70 and 72 West, N. Y. 4 Carmichael W. J., 130 and 132 Cedar, N. Y. 4 Cooney Daniel F., 40 Washington, N. Y. 4 Guerdin & Co., Market St., Boston, Mass. 4 Harrison & Gilson, 68 to 62 Water, N. Y. 4 Hoffman J. W. & Co., 28 S. Fourth, Philadelphia, Pa. 4 Jackson J. H. & Co., 28 Franklin, N. Y. 4 Judson R. F., 47 and 49 Water, N. Y. 4 Kane C., Pittsburgh, Pa. 4 Landers, Gustaf, 30 Kilby, Boston, Mass. 4 Ogden & Wallace, 85, 87 and 89 Elm, N. Y. 4 Pierce & Lee, 24 Broadway, N. Y. 4 Pullman J. Wesley, Philadelphia, Pa. 4 Quincy John W., 98 William, N. Y. 4 Richards D. W. & Co., 32 Maugan, N. Y. 4 Wallace Wm. H. & Co., Albany and Washington streets, N. Y. 4 Warner A. B. & Sons, 28 and 30 West, N. Y. 4 Whitney A. R., 3 Hudson, N. Y. 4 Iron, Manufacturers of. Bradley, Rele & Co., New Castle, Pa. 30 Burden Iron Works, Troy, N. Y. 30 Hondelet & Ellis, Boston, Mass. 30 Kirkpatrick, Beale & Co., Pittsburgh, Pa. 30 Leonard John, 40 and 42 West, N. Y. 30 North Chicago Rolling Mill Co., Chicago, Ill. 30 Oxford Iron Co., 21 Washington, N. Y. 30</p>	<p>Iron, Manufacturers of. Phoenix Iron Co., 410 Walnut, Philadelphia, Pa. 5 Roemer Iron Co., Chattanooga, Tenn. 5 Rowland James & Co., 320 N. Delaware, Phila. 5 Rowland Wm. & Harvey, Philadelphia, Pa. 5 Rowland Wm. & Harvey, Philadelphia, Pa. 5 Taylor & Boggie, Cleveland, O. 36 The Passaic Rolling Mill Co., Paterson, N. J. 36 U. S. Iron and Tin Plate Co., Pittsburgh, Pa. 36 Vulcan Iron and Nail Works, Chattanooga, Tenn. 36 Wason Car and Foundry Co., Chattanooga, Tenn. 36 Wood Allen & Co., 29 Arch, Philadelphia, Pa. 36 Zug & Co., Pittsburgh, Pa. 36 Iron, Planished Sheet, Manufacturers of. Wood Allen & Co., 29 Arch, Philadelphia, Pa. 36 Lanterns, Manufacturers of. Dietz R. E. (Tubular) 51 and 49 Fulton, N. Y. 34 DuBrul N. & Co., Cincinnati, O. 34 Howard & Morse, 45 Fulton, N. Y. 34 Lathe. Johnson, Jr. Israel H. & Co., Philadelphia, Pa. 22 Lawn Mowers. Ohio Mfg. Co., Cleveland, O. 22 Leather, Manufacturers of. Diston Henry & Sons, Philadelphia, Pa. 30 Locks, Manufacturers of. Bonham Wilson, Broadway and Kosuth, Brook. 34 Ory S. D. & Co., 132 Center, N. Y. 34 Conestoga Lock Works, Lancaster, Pa. 34 R. M. Miller Lock Co., Philadelphia, Pa. 34 Diston Henry & Sons, Philadelphia, Pa. 34 Roy Fred J., 725 Broadway, N. Y. 34 Roper & Co., Newark, N. J. 34 Smith & Egan, 132 N. 3d, Philadelphia, Pa. 34 Yale Lock Mfg. Co., 92 Chambers, N. Y. 3 Machinery, Makers of. New American File Co., Philadelphia, Pa. 32 Flinders J. B., 102 Hamilton, Phila. 32 Garvin E. & Co., 132 Center, N. Y. 34 Schell John H., 1 Second St., Baltimore, Md. 32 Niles Tool Works, Hamilton, O. 34 Pittsburgh Mfg. Co., Pittsburgh, Pa. 34 Pratt & Whitney Co., Hartford, Conn. 34 Sellers Wm. & Co., 100 Hamilton, Philadelphia, Pa. 34 Shultz E. F., 14 Dey, N. Y. 34 Thomsen, De. & Co., Philadelphia, Pa. 34 Wetherill Robert & Co., Chester, Pa. 34 Machinery (Horse's Foot Power). Chas. Chas. & Co., 19 Fulton, N. Y. 10 Machinery, Makers of. Lyon & Fellows Mfg. Co., Williamsburg, N. Y. 30 Mechanics' Tools, Makers of. Deane & Co., Worcester, Mass. 36 H. H. Harrington & Son, 121 N. 3d, Phila. 36 Van A. & Co., 100 N. 3d, Phila. 36 Malleable Iron Castings, Makers of. Ives, Woodruff & Co., Mt. Carmel, Conn. 36 Mallets. N. Y. Handle and Mallet Works, 46 E. Houston. 13 Mechanics' Tools. Johnson & Co., 49 Chambers, N. Y. 3 Measuring Tapes. Eddy Geo. M. & Co., 353 Classon Ave., Brooklyn, N. Y. 13 Meat Chopping Machinery. Tuck & Hovey, Indianapolis, Ind. 24 Metal Dealers and Brokers. Dickerson, Van Dusen & Co., 29 and 31 Cliff, N. Y. 2 Graves O. W., Cor. Cliff and Beekman, N. Y. 2 Phelps Dodge & Co., Cliff bet. John & Fulton, N. Y. 2 Purves A. & Son, Cor. South and Penn, Phila. 4 Quincy J. W., 98 William, N. Y. 4 E. D. Harrington & Son, 121 N. 3d, Phila. 36 Sellar R. & Co., St. Louis, Mo. 2 Starr John, Halifax, Nova Scotia. 31 Metallic Shingles. American Manufacturing Co., Brooklyn, N. Y. 22 Metallurgists. Booth, Garrett & Blair, 335 Chant, Philadelphia, Pa. 5 John J. Boddgett, 339 Walnut, Philadelphia, Pa. 5 Mica, etc. Chester Mica & Porcelain Co., 87 Liberty, N. Y. 37 Mill Gearing. Poole & Hunt, Baltimore, Md. 37 Mining, etc. Philadelphia Mining Mfg. Co., 31 Cherry, Phila. 9 Miners' Candles, Makers of. James Boyd's Sons, 10 and 12 Franklin, N. Y. 8 Mineral Lanes, Dealers in. Roekle & Co., Chattanooga, Tenn. 6 Mineral Wool. Elbers Alexander D., 264 Broadway, N. Y. 9 Molding Sand. Clark & Co., 157 W. 15th, N. Y. 4 Moose Traps. Dietz R. E., 45 and 47 Fulton, N. Y. 34 Prior & Co., 102 and 104 Beekman, N. Y. 34 Ripley Mfg. Co., Unionville, Conn. 34 Nails. Schoenberger & Co., Pittsburgh, Pa. 4 Hobson Francis & Son, 10 John, N. Y. 34 Nail Machinery. Coyne & Harty, Pittsburgh, Pa. 4 Boker Hermann & Co., 101 Duane, N. Y. 34 Nickel Plates. Hartman John, 374 N. Seventh, Philadelphia, Pa. 35 Nickel Plates. Condit, Hanson & Van Winkle, Newark, N. J. 35 Zucker & Levett, 63 and 61 W. 51st, N. Y. Rowland Wm. & Harvey, Philadelphia, Pa. 5 Net Brokers. Ballalant F. W., 3 and 5 Wall, N. Y. 4 Net Tapping Machines. Howard Iron Works, Buffalo, N. Y. 26 Singer, Nimick & Co., Pittsburgh, Pa. 6 The Edgar Thomson Steel Co., 57 Broadway, N. Y. 6 Baskett W. H. & Co., Pawtucket, R. I. 21 Lewis Oliver & Phillips, Pittsburgh, Pa. 16 Russell, Birdsell & Ward, Fort Chester, Pa. 21 Shelton Co., Birmingham, Conn. 12 Standard Nut Co., Pittsburgh, Pa. 11 Sternberg J. H., Reading, Pa. 11 Oil Stones. Boyd & Chase, 107th and Harlem River, N. Y. 31 Oil Tanks. Kellogg & Johnson, Elmira, N. Y. 31 Ores. Road D. W. R. & Co., 205 1/2 Walnut, Philadelphia, Pa. 5 Packing (Steam). Synards & Co., Philadelphia, Pa. 31 Paint. Iron Clad Paint Co., Cleveland, O. 8 Patent Soleleasers. Howson & Son, Phila. and Washington, D. C. 6 Stetson Thomas D., 23 Murray, N. Y. 6 Weidner John & Co., 110 South 4th, Phila. 6 Phosphor Bronze. Phosphor Bronze Smelting Co., 208 Washington St., Philadelphia, Pa. 10 Picks, Makers of. Pierson & Co., 24 Broadway, N. Y. 4 Pierson, Fitts & Co., Makers of. Eaton, Cole & Burnham Co., 92 John, N. Y. 32 McNab & Hartin Mfg. Co., 92 John, N. Y. 32 Fairbank & Co., 227 Pearl, Philadelphia, Pa. 32 Pipe Tongues. Mansfield Elastic Pro. Co., New Haven, Conn. 35 Pipe, Water, etc., Makers of. McNeals & Archer, Burlington, N. J. 6 Wood R. D. & Co., 220 Chestnut, Philadelphia, Pa. 14 Plate Irons. Buck Bros., Millbury, Mass. 10 D. R. Barton Tool Co., Rochester, N. Y. 21 Plate Manufacturers. Bailey Wringing Machine Co., 92 Chambers, N. Y. 21 D. R. Barton Tool Co., Rochester, N. Y. 21 Stanley Rule and Level Co., 92 Chambers, N. Y. 10 Plated Ware. Hall, Elton & Co., 71 Chambers, N. Y. 10 Plumbers' Materials. Carr Wm. S. & Co., 106 Center, N. Y. 32 Everhart Jas. M., Scranton, Pa. 32 Presses, Fruit and Vegetable. Boker Hermann & Co., 101 Duane, N. Y. 34 Mohawk & Hudson Mfg. Co., Watford, N. Y. 34 Presses, Power, Makers of. Bliss & Williams, 107 Plymouth, Brooklyn, N. Y. 29 Kerriman & Co., West Chester, Ohio. 29 The Siles & Parker Press Co., Middletown, Ct. 37 Printing Presses. Nicholson & Co., Morien, Ct. 38 Pulleys, Friction. Penfield Block Works, Lockport, N. Y. 24 Providence Tool Co., Providence, R. I. 34 Pumps, Makers of. Acid Pump & Siphon Co., New London, Conn. 37 Davis L. B. & Co., Liberty, N. Y. 38 Donzias W. & B., Middletown, Conn. 37 Gunnison A. B., Erie, Penn. 32 Rumsey & Co., Seneca Falls, N. Y. 32 Rumsey L. M. & Co., St. Louis, Mo. 32 Union Mfg. Co., 92 Chambers, N. Y. 38 Rails, Iron and Steel, Makers of. Cambria Iron Co., Johnstown, Pa. 5 The Edgar Thomson Steel Co., 57 Broadway, N. Y. 6 Car Wheel & Locomotive Forgings. Wilson, Walker & Co., Philadelphia, Pa. 30 Ratchets. Faucett & Maule, Philadelphia, Pa. 22 Regulating Machines. Benton Mfg. Co., 30 Cortland, N. Y. 37 Rimor Wm. of Wm. Baltimore, Md. Grundy Geo. C., 15 Greenwich, N. Y. 37 Chas. Colver, 150 West, Kingston, Mass. 37 Townsend W. P. & Co., Pittsburgh, Pa. 13 Rolls (Chilled). Ricketts & Co., Philadelphia, Pa. 5 Rules, Manufacturers of. Stanley Rule and Level Co., 92 Chambers, N. Y. 10 Saws, Manufacturers of. American Machine Co., Philadelphia, Pa. 23 Enterprise Mfg. Co., Philadelphia, Pa. 23 Richards D. W. & Co., 32 Maugan, N. Y. 4 Baeder, Adamson & Co., 750 Market, Philadelphia, Pa. 23 Sash Tighteners. Brown & Sons, 26 Greenwich, N. Y. 34 Saws, Makers of. American Saw Co., Trenton, N. J. 34 Diston Henry & Sons, Philadelphia, Pa. 30 Wheeler, Madden & Clemens Mfg. Co., Middle-town, N. Y. 34 Sealers, Manufacturers of. Castillon John & Sons, 31 Cliff, N. Y. 9 Howe Seal Co., Rutland, Vt. 7 Screws, Makers of. American Screw Co., Providence, R. I. 21 Miles F. S., 25 Quarry, Phila. 21 Philadelphia Screw Co., Philadelphia, Pa. 21</p>	<p>Tacks. American Tack Co., Fairhaven, Mass. 37 Dunster, Howard & Whidden, 115 Chambers, N. Y. 33 Field A. & Sons, Tanton, Mass. 9 Grundy Geo. C., 15 Greenwich, N. Y. 37 Shadlow Co., Birmingham, Ct. 37 Tape and Dies. Carpenter J. M., Pawtucket, R. I. 36 Manning H. S. & Co., 111 Liberty, N. Y. 36 Wiley & Russell, Greenfield, Mass. 36 Tin Plate, Importers of. N. & G. Taylor Co., Philadelphia, Pa. 3 Tin Plate, Manufacturers of. U. S. Iron and Tin Plate Co., Pittsburgh, Pa. 36 Tin Ware, Stamped and Japanned. Shepard Sidney & Co., Buffalo, N. Y. 27 The Chicago Stamping Co., Chicago, Ill. 3 Tools,</p>
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Free Trade in England.

Mr. Chas. G. Leland, writing from England, says:

Notwithstanding the boast so often repeated, that England is a free trade country, it is a most remarkable fact that there is not a country in the world which, while it would withhold the benefit of protection from other countries, suffers so much from its abuses. For in this land of free trade there is not a branch of manufactures which is not controlled by unions and regulated by strikes, and it would be, in fact, difficult to conceive a state of society in which the right of the consumer to buy directly from the producer is more cruelly prevented by tyrannical combinations, which, when examined, turn out to be protection in its most irritating form. For instance, a gentleman who has, despite many obstacles, thoroughly examined the fish supply of England, finds that there is a gigantic society, with vast capital, which purchases almost every fish caught on the British coasts. As it must maintain equal prices, and as fish come in very irregularly, it becomes necessary to destroy immense quantities. These might, indeed, be salted or given to the poor, but even this in the end would lead to a light loss. All fish are purchased at the seaside at a rate varying from one farthing to three half-pence per pound. In London they are at once delivered to certain of these most decided protectionists, who are called Bummaries, and when finally they reach the retailer they are sold at six pence a pound. "Here then," says Mr. Leland, "by a flagrant abuse of protection, and in a country which glorifies itself as vindicating the right of every man to buy cheaply, we find, during a period of semi-famine among the poor, the price of a most essential article of food raised several hundred per cent., enormous quantities being in the meanwhile constantly destroyed that this extortion may be sustained."

Recent Tests of Steel for Shipbuilding.

A highly interesting report on some tests made with steel produced at the John Cockerill Works, at Seraing, Belgium, has been presented to Lloyd's Register, by J. Williamson, surveyor to Lloyd's. It appears that on a former occasion Mr. Williamson had made some tests at Seraing, and had submitted as the result that the material possessed a want of uniformity in the ductility and elasticity of the material, which would not insure a uniform fulfillment of Lloyd's requirements. He attributed these results to the use by the Cockerill Company of spiegeleisen, and recommended the employment of ferromanganese. The Cockerill Company requested that these first tests should be looked upon in the light of preliminary trials. They made further experiments, of which the report now before the public is the result.

For the purposes of the mechanical and chemical tests, sample ingots from four different charges were selected, viz.: Numbers 8544, 6593, 6594, and 9461 respectively, and rolled into plates, angle irons, beams, bars, &c. The charge No. 9461 was selected as a sample of the material recommended by the Société John Cockerill as being, in their opinion, very suitable for boiler-making purposes; and as it was known before testing it, that it would withstand a higher tensile strain than is at present admitted for shipbuilding purposes, the results of the tests of the said charge have been shown separately from the other three charges which were selected from the material made to fulfill the committee's requirements for shipbuilding.

The following are the results of the chemical analyses of the charges selected for experimental purposes, and for comparison the results of the chemical analyses of three other samples of "mild" steel made by other makers for shipbuilding purposes, are given. Sample No. 1 was sent to Seraing from the Tyne, and is alleged to be a portion of steel being used in building a steamer there; and samples numbered 2 and 3 were pieces of "soft" steel made in Sweden.

A glance at the above results of the chemical analyses of the several samples, will show that the shipbuilding steel made at Seraing is as comparatively free of impurities as either the English or Swedish samples.

A number of samples of steel plates, selected from the above-mentioned charges, made by the Société John Cockerill, were carefully prepared for the purpose of ascertaining the elastic and ultimate tensile strength of the material. Some of the samples were tested unannealed, and some after being annealed.

The mean ultimate strength of five unannealed samples lengthwise of the fiber was 28.1 tons per square inch of section, with a mean ultimate elongation of 24.4 per cent. on a length of 8 inches. These mean results quite fulfill the committee's requirements. But on looking more closely into the details, a want of uniformity in the results was observed. For instance, the ultimate tensile strength ranged from 24.5 to 35.3 tons per square inch of section, and the elongation from 18.8 per cent. to 27.6 per cent. on a length of 8 inches.

On the other hand, the results of the tests of the annealed plates were very satisfactory, both as regards the ultimate tensile strength and elasticity, as well as in the uniformity of those results in detail. The mean ultimate strength of six annealed samples lengthwise of the fiber was 29.6 tons per square inch of section, with a mean ultimate elongation of 22.07 per cent. on a length of 8 inches; while the ultimate tensile strength of six specimens varied only from 29.1 to 31.1 tons per square inch of section, and the elongation from 20.08 to 25.0 per cent.

The mean ultimate strength of six annealed samples crosswise of the fiber was 28.8 tons per square inch of section, with a mean ultimate elongation of 21.7 per cent. on a length of 8 inches. The ultimate tensile strength of these six specimens varied from 27.7 to 30.2 tons per square inch, and the elongation from 20 to 24 per cent.

These results show the great importance of annealing after rolling, in order to insure uniformity in the character of the material before it leaves the maker's works, as from inquiries instituted after the above tests were made, it was ascertained that the want of uniformity shown by the unannealed plates arose entirely from their being allowed to cool in damp and exposed places after rolling. Experience has also shown how desirable it is to anneal steel plates after hammering or partial reheating at the shipbuilders' or boiler-makers' works.

Another curious feature worth mentioning is that, while annealing made the material more uniform in quality, as might have been expected, it seems to have also had the effect of proportionately reducing its elasticity and raising its ultimate strength. In all other tests annealing has had exactly the contrary effect upon steel.

Attention should also be directed to the fact that the elastic stress borne by this material was unusually high, the unannealed plates having given a mean of 18.7 tons, and the annealed plates 20.8 tons per square inch of section. This quality would render the steel capable of withstanding comparatively high longitudinal strains, as well as impart a high percentage of local rigidity to a structure.

Cheap Gas.

NEW YORK, February 10, 1879.

To the Editor of The Iron Age.—DEAR SIR: The public are expecting that the electric light will soon reduce the present high price of coal gas, but as the general introduction of this system into dwellings, hotels and railway cars is still in the future, some attention might be given with advantage to a cheap gas, which has been successfully introduced in Europe for lighting hotels, dwellings, railway cars, buoys, &c. This gas is made of fat, petroleum refuse, paraffine refuse, &c., and has a much greater value for America than for Europe, as in this country the price of coal gas is high and petroleum cheap, but in Europe gas is cheap and petroleum expensive. The gas is very rich, and an ordinary light consumes only about three-quarters of a cubic foot per hour, while coal gas must be burned from tips consuming 4 to 6 feet. If, therefore, the cost per light for coal gas is from 1 to 1½ cents per hour, the cost of the oil gas is between ¼ and ½ cent per hour, supposing the gas to cost the same per 1000 cubic feet in each case.

Mr. Pintsch, of Berlin, is the inventor of this new lighting system. The manufacture of oil gas is not new, however. It has been made for many years in this country and abroad, but the construction of Pintsch's furnaces is new, and makes a fixed gas which cannot be condensed in the pipes nor suffer loss in volume from any cause. The introduction of Pintsch gas for large cities with an extensive underground pipe system, is not to be recommended, but for smaller towns it could be applied with great advantage.

The cost of a gas works which would manufacture in 24 hours gas for one light for 12,000 hours, would be about \$15,000. The gas can be manufactured for about \$3.50 per 1000 feet, but 1000 feet of Pintsch gas possesses an illuminating power equal to 6000 feet of coal gas. The use of Pintsch gas in a compressed form is very extensive in Europe, and is especially adapted for lighting railroad cars, steamers, ferries, mines, streets, parks, and in buoys to mark the entrances of harbors and places difficult to navigate at night. It has been used with success for several years in Germany, Russia and England, and there are now about 6000 cars of the principal European railways provided with Pintsch gas, the inventor having received different gold medals, the latest from the Society of Arts in London, in a railway lamp competition. In consequence, the Metropolitan Underground Railroad of London has adopted it for the whole line.

The compressed gas is used in the following way: From the meter it passes into a small gasometer, which, in proportion to the production, requires only a capacity of from 1200 to 1800 cubic feet, as during the process of making the gas is compressed into holders, and so kept in stock for use in carriages, ships, lamp posts, &c. An iron cylinder about 6 feet long and 18 inches diameter, is large enough to contain compressed gas for 72 hours for one burner, under a pressure of 90 lbs. The gas passes from the cylinder to the burner through the regulator, which is the most important feature of the system. The construction of the regulator is peculiar. It consists of a cast iron conical vessel of about 12 inches diameter and 6 inches high, the upper part of which is closed by a gas-tight membrane. To the center of this is fastened a rod with movable joint, and this again is connected with a lever attached to a valve, and by means of this and springs, a perfectly even pressure at the burner is maintained under all circumstances.

The delicate action of the parts of the regulator gives a steady flame, which is never extinguished accidentally, either at sea or in railway coaches. The burner is a small fish-tail of steatite, and its form is such as to give a flame of the best shape.

The advantage of using the gas in compressed form is, that it permits the distribution without any expense for the laying and maintenance of mains and distributing systems. The gas is made at some convenient point, and the cylinders are there filled; or it may be pumped into suitably constructed vehicles, and thus carried to the cylinders, as in the case of buoys. At his works, near Berlin, the inventor gives employment to more than 1000 persons in manufacturing apparatus. The system is one which should be better known in this country, and should its introduction be effected, it will be attended with convenience and economy.

Yours, respectfully, ERNST SCHOENROCK.

Although manufacturing only for the short period of eight months, the Buffalo Forge Company, of Buffalo, have sold 500 forges and blacksmiths' blowers. Besides their large orders from New York, Boston and Philadelphia, large quantities have been sent to California and Canada. They have recently shipped goods to Cuba.

TUCKER & DORSEY, MANUFACTURERS.



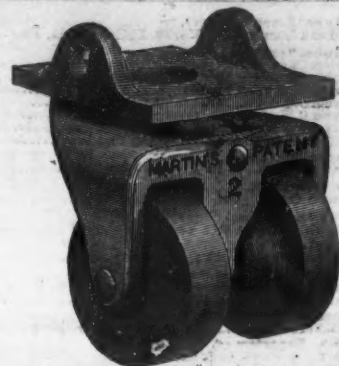
George N. Pierce & Co.,

BUFFALO, N. Y.,
Manufacturers of

Bird Cages, Refrigerators

AND
HOUSE FURNISHING GOODS.

Send for Illustrated Catalogue.



PHENIX CASTER CO., Indianapolis, Ind.
St. Paul, Jan. 28, 1879.
Your Casters are a fraud upon all other casters, for when once a person has used yours all others are thrown aside. When our present large stock of other casters are exhausted we will give you a liberal order, for your goods are the best, strongest and most serviceable we have ever seen; in fact, they are perfect. We mean what we say.
DECOSTER & CLARK.

PHENIX CASTER CO., Indianapolis, Ind.

Brooklyn White Lead Co.

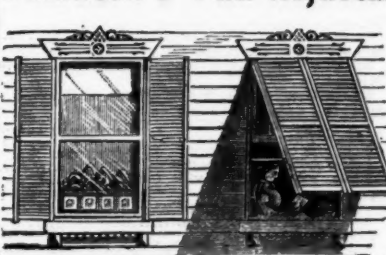


White Lead, Red Lead & Litharge.

89 Niden Lane, NEW YORK.

FISHER HOWE, TREASURER.

Dearborn's Pat. Adjustable Blind Awning Fixtures.

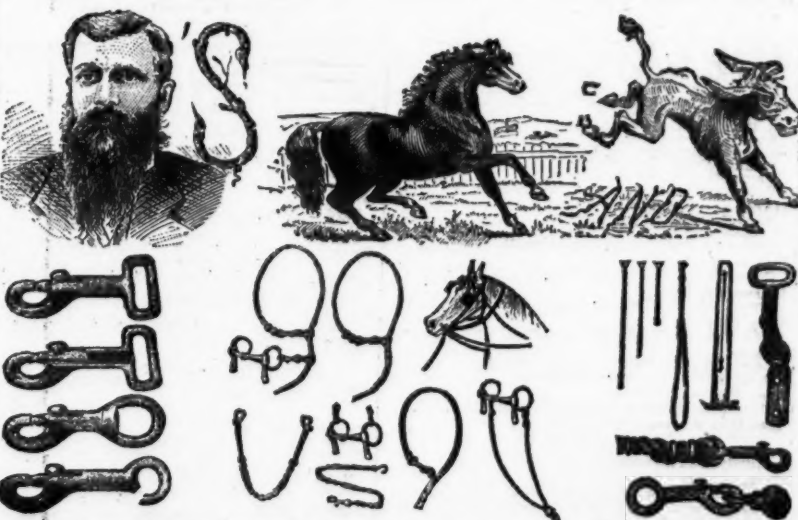


Either old or new Blinds thus fitted can be opened in the usual way or used as an awning at pleasure.

For particulars address the sole manufacturers,

BOSTON BLOWER CO.,

Boston, Mass.



COVERT'S HORSE AND MULE JEWELRY.

Consisting of Covert's Celebrated Harness Snaps, Swivel Snaps, Open Eye Bit and Chain Snaps, Snap and Thimble for Horse and Cattle Ties, Rope Goods consisting of Horse Ties, Cattle Ties and Halter Leads, Leather Horse Ties, Breast Chains, Halter Chains, Martingale Chains, Rein Chains, Post Chains, Post Rides, &c. These goods are far superior to anything of the kind on the market. They have from real merit become standard, and never fail to give entire satisfaction. They are sold by all leading jobbers in general and saddlery hardware at manufacturers' prices. Special attention is called to our new patented Rope Goods. No more braiding or winding ends with cord; all accomplished with machinery by clamping the rope with steel rings, which enables us to make better goods at reduced prices. Send for catalogue and price list. Address COVERT MFG. CO. Sole Manufacturers, Troy, N. Y.



THE SWIFT MILL.

ESTABLISHED 1845.

The annexed cut shows one of the many styles of Coffee Mills of our manufacture, especially adapted to Grocers' use and all retailers of coffee. They are highly ornamental, and workmanship of the very best. We make more than 30 styles.

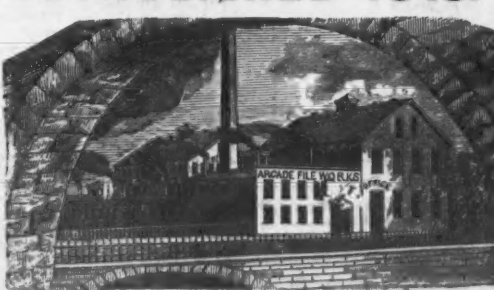
ALSO LANE'S PORTABLE COFFEE ROASTER

Will roast 30 to 40 lbs. at once, and can be used as a stove at other times. Send for descriptive list to Manufacturers.

LANE BROS., Millbrook, N. Y.

Also sold by leading wholesale houses.
Our agents, Graham & Haines, 113 Chambers St., New York, carry a full line of our goods, and will be pleased to serve you at Factory prices.

ESTABLISHED 1848.



C. T. DRAPER & CO.

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Manufacturers of SUPERIOR

HAND CUT

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Made from Best

ENGLISH CAST STEEL.

Quality guaranteed by written warranty when required.

THE "OLD RELIABLE" UNIVERSAL Clothes Wringer.



Improved with Rowell's Double Cog-Wheels on both ends of each roll.

Over 500,000 sold!

And now in use, giving "Universal" satisfaction.

EVERY WRINGER WARRANTED.

Be sure and inquire for the "Universal."

Sold by the Principal Jobbers in Hardware and House-Furnishing Goods everywhere.

Special rates given for export.

Metropolitan Washing Machine Co.

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TRADE MARK.

The Atlantic White Lead

and Linseed Oil Co.,

MANUFACTURERS OF

White Lead (Atlantic), Red Lead,

Litharge & Linseed Oil.

ROBERT COLGATE & CO.,

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PHILADELPHIA.



TRADE MARK.

MANUFACTURERS OF

Pure White Lead, Red Lead, Litharge,

Orange Mineral, Linseed Oil,

AND PAINTERS' COLORS.

JOHN JEWETT & SONS,

Manufacturers of the well-known brand of

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ALSO MANUFACTURERS OF

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182 Front Street, NEW YORK.

TACKLE BLOCKS

Burr & Co.,

Manufacturers of Waterman and Russell's

Patent Iron Strapped Blocks.

Also, Manufacturers of

ROPE STRAPPED BLOCKS.

31 Peck Slip, New York.

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MANUFACTURER OF

CAULKING IRONS,

Cotton, Freight and Hay Hooks,

No. 288 Monroe Street,

Bet. Jackson & Corleons Sts., NEW YORK.

AMERICAN SCREW CO.,

Providence, R. I.,

MANUFACTURERS OF MORE THAN 4000 VARIETIES OF PRODUCT,
AND INCREASING THE ASSORTMENT DAILY.

Machinery employed contains important inventions recently patented, and which are designed to produce Screws at a lower cost to the consumer than has ever been attained.

All goods are distributed through the Hardware trade, to whom a liberal discount will be allowed.

INTERNATIONAL EXHIBITION.

(No. 235.)

PHILADELPHIA, 1876.

The United States Centennial Commission has examined the report of the Judges, and accepted the following reasons, and decreed an award in conformity therewith.

PHILADELPHIA, November 8, 1876.

REPORT ON AWARDS.

Product: Iron, Brass and Steel Screws, Tire and Stove Bolts, Rivets.

Name and address of Exhibitor: American Screw Company, Providence, R. I.

The undersigned having examined the product herein described, respectfully recommends the same to the United States Centennial Commission for Award, for the following reasons, viz: Being of a quality nearly approaching perfection, showing the highest attainment in this branch of manufacture.

G. L. REED, Signature of the Judge.

Approval of Group Judges.

Daniel Steinmetz,
Jas. Bair,
Chas. Staples,

G. L. Reed,
J. D. Imboden,

J. Diefenbach,
Dav. McHardy.

A true copy of the record. FRANCIS A. WALKER, Chief of the Bureau of Awards,
Given by authority of the United States Centennial Commission.

A. T. GOSHORN, Director-General.

[L.S.] J. L. CAMPBELL, Secretary.

J. R. HAWLEY, President.



After forty years' experience we offer to the trade our Centennial Screws, patented May 30, 1876, as the best we have ever known.

The method of manufacturing is also patented, and we are changing our machinery as fast as possible, to manufacture the improved article only. To introduce them, they will be sold at the same price as the old style screw.

The new screws will be packed in manila colored boxes with the new label covering end of box, and enlarged figures showing plainly contents.

To distinguish this screw we have adopted a trade-mark, which is also secured to us.

The accompanying engravings show the progress of making screw from the old blunt point to, style now adopted.

Experience has shown that the wear point of screws, as formerly made, is at the heel of the thread, where all



1776.



1846.

Patented August 30.



1876.

Patented May 30.

COVERED BY TRADE MARK.

Estimated to be FIFTY PER CENT. stronger than a Screw as Commonly made.

Section at Line A B

Section at Line C D

Section at Line E F

Section at Line A B

Section at Line C D

Section at Line E F

the strains of forcing the screw into the wood naturally concentrate.

To avoid the sharp angle existing in the old style of screws has been the aim of all manufacturers, but every expedient hitherto adopted has proved as objectionable as the evil complained of.

It will be seen in our new screw that not only is the sharp angle avoided, but the strength very much increased, as illustrated. See sections at lines.

CLAIM.

"A Pointed Wood Screw having the outer periphery of the thread upon its body cylindrical, while a portion of the body below the thread and near the neck is conical, the remainder of the body to the point being cylindrical, and yet having all the thread brought to an edge of a constant angle, without jogs in the paths between the threads, substantially as described."

New York Wholesale Prices, February 12, 1879.

HARDWARE.

[illegible][illegible][illegible]

"Lightning".....	✓ dos \$20.00 net
Wadsworth's	dis 25 1/2
Hinges.....
"Patent".....	✓ dos \$6.75, dis 60 1/2
"Clamp".....	✓ dos \$8.75, dis 60 1/2
Gate, Clark's No. 1.....	✓ dos \$6.00, dis 90 1/2
"2, Y. Male".....	✓ dos \$2.25, dis 60 1/2
Common Sense.....	dis 20 1/2
Seymour's.....	dis 20 1/2
Roller Hinged Hinges.....	dis 60 1/2
Rotted Plate.....	dis 70 1/2
Wrought Strap and T. list Dec. 25, 17.....	dis 60 1/2
Plate Hinges.....	6 to 10 in. 140 1/2
"Corbin's".....	8 1/2 to 12 in. 140 1/2
Screw Hook and Strap.....	1 1/2 to 1 3/4 in. 110 1/2
Heavy Welded Hook.....	1 1/2 to 2 in. 110 1/2
"Corbin's".....	1 1/2 to 2 in. 110 1/2
Screw Hook and Eye.....	1 1/2 to 2 in. 110 1/2
"Corbin's".....	1 1/2 to 2 in. 110 1/2
Hooks—Solid Shank, C. S.	✓ dos \$1.75, dis 15 1/2
Socket.....	✓ dos \$1.75, dis 15 1/2
Riveted Shank.....	✓ dos 5 1/2, dis 15 1/2
Planters.....
"Patent".....	dis 90 1/2
Hick's Pat. Solid C. S. Planters'.....	dis 20 1/2
Winsted & Lane, Planters'.....	dis 20 1/2
"Scovill Pattern".....	dis 20 1/2
Hooks.....
Bird Cage, Sargent's list.....	dis 70 1/2
Cotton.....	dis 10 1/2
Beil.....	dis 20 1/2
Bench-Hooking's \$5.00 ✓ dos.....	dis 10 1/2
"McCall's".....	dis 10 1/2
"McCall's".....	dis 10 1/2
Skinner's, 3¢ per doz.	dis 10 1/2
Clothes Line.....	dis 10 1/2
Reading list.....	dis 10 1/2
Reading list.....	dis 10 1/2
Reading list.....	dis 10 1/2
Tassel (T. & S. Mfg. Co.).....	dis 40 1/2
Wrought Stands and Hooks and Staples, dis 70 1/2	dis 70 1/2
Wire Screw Hooks and keys.....	dis 70 1/2
Guns and Bush.....	dis 40 1/2
Hooks and Nails—Malleable Iron.....	dis 60 1/2
Horse Nails.....	dis 60 1/2
Assault.....	No. 6 7 8 9 10
Polished.....	210 230 250 270 290 310
or Blued.....	210 230 250 270 290 310
Pointed and Polished.....	210 230 250 270 290 310
Cortland P'd & Blued.....	210 230 250 270 290 310
Globe (New list).....	No. 6 7 8 9 10
H. P. Pointed and.....	210 230 250 270 290 310
Finished.....	210 230 250 270 290 310
North Western.....	210 230 250 270 290 310
National, Pointed and.....	210 230 250 270 290 310
Putnam Hammer, P'd.....	210 230 250 270 290 310
Vulcan P'd & Blued.....	210 230 250 270 290 310
R. I. Horse Shoe Co., Perkins Improved Light.....	\$ keg 3.62 1/2
Medium and Heavy.....	\$ keg 3.62 1/2
Perkins Snow.....	\$ keg 3.62 1/2
Ice A Wile, Chicago, &.....	dis 45 1/2
National.....	dis 45 1/2
Novelty Ice Breakers.....	dis 45 1/2
Dunlap's Ring Picks.....	dis 25 1/2
Wood lined Picks, Sargent's.....	dis 50 1/2
Ice Mallets Pick in Head.....	dis 1 1/2 net
Pick in Handle.....	dis 50 1/2 net
Aces, Sargent's.....	dis 2 1/2 net
Kitchen Ice Tong.....	dis 2 1/2 net
Combination Ice Tools.....	dis 30 1/2
Brass, 70 to 15 inches inclusive.....	dis 30 1/2
Brass, larger than 15 inches.....	dis 30 1/2
Anvils.....
Amer. Butcher Knives.....	dis 20 1/2
Bread.....	dis 15 1/2
Moran's Shos and Bread Knife.....	dis 15 1/2
Hair and Bone "Wadsworth's".....	dis 15 1/2
Table and Pocket.....	See Cutlery
Knobs.....	dis 60 1/2
Carriage Padlock Sec. V gross).....	dis 30 1/2
Base-Common.....	dis 70 1/2
Door, Mineral.....	dis 70 1/2
Por. Jap'd.....	Same discounts as Door Locks.
Furniture, China.....	dis 10 1/2
Picture (T. & S. Mfg. Co.).....	dis 50 1/2
Sargent's.....	dis 50 1/2
Shutter, Corbin.....	dis 10 1/2
Ladders.....
Melting-Hart's.....	dis 10 1/2
Reading.....	dis 15 1/2
Monroe's Patent.....	dis 20 1/2
Lanterns.....	No. 9, \$10.00; No. 1, \$15.00 net
Hurricane.....	dis 35 1/2
Feet.....	dis 35 1/2
Strady's Patent.....	dis 10 1/2
De Beque.....	dis 10 1/2
Police.....	dis 10 1/2
Love Defector.....	dis 10 1/2
Linemen Squeezers.....	dis 20 1/2
Forcible.....	dis 20 1/2
Dunlap's Improved.....	dis 20 1/2
Townsend.....	dis 30 1/2
Lines—Linen Flat.....	dis 25 1/2
Sl. Lake Chalk.....	No. 9, 1, 2, 3, \$6.00, \$6.50, \$7.00, \$7.50
Wire Closets, Galvanized.....	each 30 1/2 40 1/2 net
Locks and Latches.....
Label.....
Gaylord.....	dis 35 1/2
Bridgeport.....	dis 35 1/2
Barnes & Davis.....	dis 35 1/2
Trunk.....	dis 25 1/2
Langroth & Crane's List Jan. 1, 77.....	dis 20 1/2
Flat Key.....	With Guards, ex extra,.....
Barnes & Davis, Flat Key.....	dis 35 1/2
Timmerman's Flat Key.....	dis 35 1/2
Shepardson's, Flat Key.....	dis 35 1/2
American Lock Mfg. Co.....	dis 35 1/2
Wm. Manly's "Extension Cylinder".....	\$10.50 ✓ dos, net
Door Locks, ac.....	dis 50 1/2
Norwalk.....	dis 50 1/2
Norwich.....	dis 50 1/2
Mallory, Wheeler & Co.....	dis 50 1/2
Reading Hall.....	dis 50 1/2
Continental.....	dis 35 1/2
Padlocks.....
Mallory, Wheeler & Co.....	dis 35 1/2
Wm. Wilcox & Co.....	dis 35 1/2
Komer's.....	dis 35 1/2
Conestoga.....	dis 35 1/2
Barnes & Davis.....	dis 35 1/2
Penn Lock Works.....	dis 35 1/2
Mallets.....	dis 10 1/2
Mallet Cutters.....
Dixon's (P. & W.) No. 1.....	dis 40 1/2 100 1/2 200 1/2 300 1/2 400 1/2 500 1/2 600 1/2 700 1/2 800 1/2 900 1/2 1000 1/2 1100 1/2 1200 1/2 1300 1/2 1400 1/2 1500 1/2 1600 1/2 1700 1/2 1800 1/2 1900 1/2 2000 1/2 2100 1/2 2200 1/2 2300 1/2 2400 1/2 2500 1/2 2600 1/2 2700 1/2 2800 1/2 2900 1/2 3000 1/2 3100 1/2 3200 1/2 3300 1/2 3400 1/2 3500 1/2 3600 1/2 3700 1/2 3800 1/2 3900 1/2 4000 1/2 4100 1/2 4200 1/2 4300 1/2 4400 1/2 4500 1/2 4600 1/2 4700 1/2 4800 1/2 4900 1/2 5000 1/2 5100 1/2 5200 1/2 5300 1/2 5400 1/2 5500 1/2 5600 1/2 5700 1/2 5800 1/2 5900 1/2 6000 1/2 6100 1/2 6200 1/2 6300 1/2 6400 1/2 6500 1/2 6600 1/2 6700 1/2 6800 1/2 6900 1/2 7000 1/2 7100 1/2 7200 1/2 7300 1/2 7400 1/2 7500 1/2 7600 1/2 7700 1/2 7800 1/2 7900 1/2 8000 1/2 8100 1/2 8200 1/2 8300 1/2 8400 1/2 8500 1/2 8600 1/2 8700 1/2 8800 1/2 8900 1/2 9000 1/2 9100 1/2 9200 1/2 9300 1/2 9400 1/2 9500 1/2 9600 1/2 9700 1/2 9800 1/2 9900 1/2 10000 1/2 10100 1/2 10200 1/2 10300 1/2 10400 1/2 10500 1/2 10600 1/2 10700 1/2 10800 1/2 10900 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Dundries.

Ash stum.....	sd.	sd.	sd.	sd.
Bearhide.....	sd.	sd.	sd.	sd.
Chalk.....	sd.	sd.	sd.	sd.
" Block.....	sd.	sd.	sd.	sd.
Dryer, Patent, Am'c.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Frostings.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Gine, White.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
" Sheet.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Glassiers' Points, Zinc.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Gum, Copal.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Spirits Turpentine.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
" Shellac, English.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Litharge, English.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Mineral Wool.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Pumic Stone, selected Lamp.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
" powdered.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Putty, in bladders.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
" in bulk.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Rotten Stone, soft, English.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Spirits Turpentine.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....
Whiting Spanish.....	.....	sd.	.....	sd.	.....	sd.	.....	sd.	.....

Glass.

FRENCH WINDOW GLASS.

Prices current per box of 50 feet.

Single Thick.—discount 60to 70

SIZES.	1st.	2d.	3d.	4th.
0 X 8 to 10 X 15.....	\$ 8.00	\$ 6.75	\$ 6.25	\$ 5.75
12 X 14 to 18 X 24.....	8.75	8.25	7.75	7.25
18 X 24 to 20 X 30.....	11.75	10.50	9.75	9.00
15 X 36 to 20 X 30.....	12.75	11.50	10.50	9.75
20 X 36 to 24 X 30.....	15.50	13.25	11.75	10.50
20 X 36 to 24 X 48.....	14.75	13.00	11.75	10.50
26 X 40 to 30 X 50.....	16.25	15.00	13.50	12.25
30 X 50 to 34 X 50.....	17.25	15.75	14.25	13.00
30 X 50 to 34 X 50.....	16.75	15.00	13.50	12.25
34 X 50 to 34 X 50.....	19.50	18.00	16.50	15.00
30 X 50 to 40 X 60.....	21.00	19.50	18.00	16.50

Double Thick.—Discount 70to 75

SIZES.	1st.	2d.	3d.	4th.
6 X 8 to 10 X 15.....	\$12.00	\$11.00	\$10.00	\$9.00
12 X 14 to 18 X 24.....	14.75	13.75	12.75	11.75
18 X 24 to 20 X 30.....	19.00	17.75	16.50	15.25
15 X 36 to 20 X 30.....	21.50	19.75	18.00	16.25
20 X 36 to 24 X 30.....	25.00	23.00	21.25	19.50
20 X 36 to 24 X 48.....	25.00	23.00	21.25	19.50
26 X 40 to 30 X 50.....	27.00	25.25	23.50	21.75
30 X 50 to 34 X 50.....	28.50	26.00	24.25	22.50
30 X 50 to 34 X 50.....	30.00	27.75	26.00	24.25
34 X 50 to 34 X 50.....	31.75	29.00	27.00	25.00
30 X 50 to 40 X 60.....	35.50	32.50	30.25	27.50

Sizes above 40 X 60—\$10.00 per box extra for every five inches.
An additional 10 per cent. will be charged for all Glass more than 40 inches wide. All sizes above 5 inches in length, and not making more than 8 united inches, will be charged in the 4 united inches bracket.

BRIDGE & CO.,
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14 in., 14 in. Plates. Shears for Plates and Bars
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PUNCHING PRESSES.
Steel, adapted to all trades.

TRANSPORTATION CAN.
(Patented.)

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GALLONS.

Circulars

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Standard and Purity,
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Ring Bush Hooks,
Ax Eye Bush Hooks,
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Watt's Ship Carpenters' Tools,
Carpenters' Drawing Knives,
Coopers' and Turnpentine Tools.
MADE BY
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G. B. WALBRIDGE & CO.,
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Combination Punch and Shears.
Cuts Round and Flat Iron.

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DRILLS, SHEARS AND PUNCHING PRESSES.
For Workers in Iron and Steel, adapted to all trades.
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A Weekly Journal of the
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THE SHEET-METAL WORKER AND THE STOVE AND
TIN-TRADE JOURNAL.
Published every Saturday Morning.

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and is rapidly increasing in circulation and influ-
ence. It is so well known as to need but brief
introduction, even to those not regular subscribers;
but a synopsis of its principal features may serve
to show in part its practical utility.

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of general as well as special interest to all classes
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in such of the arts and sciences as are directly or
indirectly related to the trades we represent. It is
liberally illustrated, and is as attractive in ap-
pearance as it is convenient in size and shape. Its
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four years, have been practical and valuable, and
its conductors have spared neither trouble nor ex-
pense in making this department useful. The be-
lief obtainable has been engaged to assist
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simplest to the most complex, and we have always
been glad to give rules and drawings for anything
asked for by our readers. These rules and
grams have been to a great extent original,
much care has been taken to make them accu-
rate and simple, and we have always been glad
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ings for anything asked for by our readers.

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has given special and intelligent attention to
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fined to the Plumber's art. The intimate ac-
quaintance of its Editor, Mr. James C. Bayles, with
theory and practice of plumbing, hydraulic
sanitary science in their relations to house-
age and water service, has enabled The
Worker to furnish the trade with a practical
shop literature, and its labors in this
direction have done much to raise the standard of work
and extend the market for good material
fixtures. Hundreds of its readers rely
Editorial questions which call for knowl-
edge of their own experience, and through
them we have thus been able to give a
vast amount of practical information, in
every-day wants of the reader.

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The following extracts from the
correspondence of our office show how
The Worker is regarded throughout the
country.

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Ind.

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the best of the trade, and think no per-
son in the trade and tin business can do
without it."

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journal who does not think that a
four weekly issues is not worth the
cost for one year."

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the best of the trade, and think no per-
son in the trade and tin business can do
without it."

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"I prize The Metal Worker very
highly, and forward to Monday
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of The Metal Worker, and my anticipations are never
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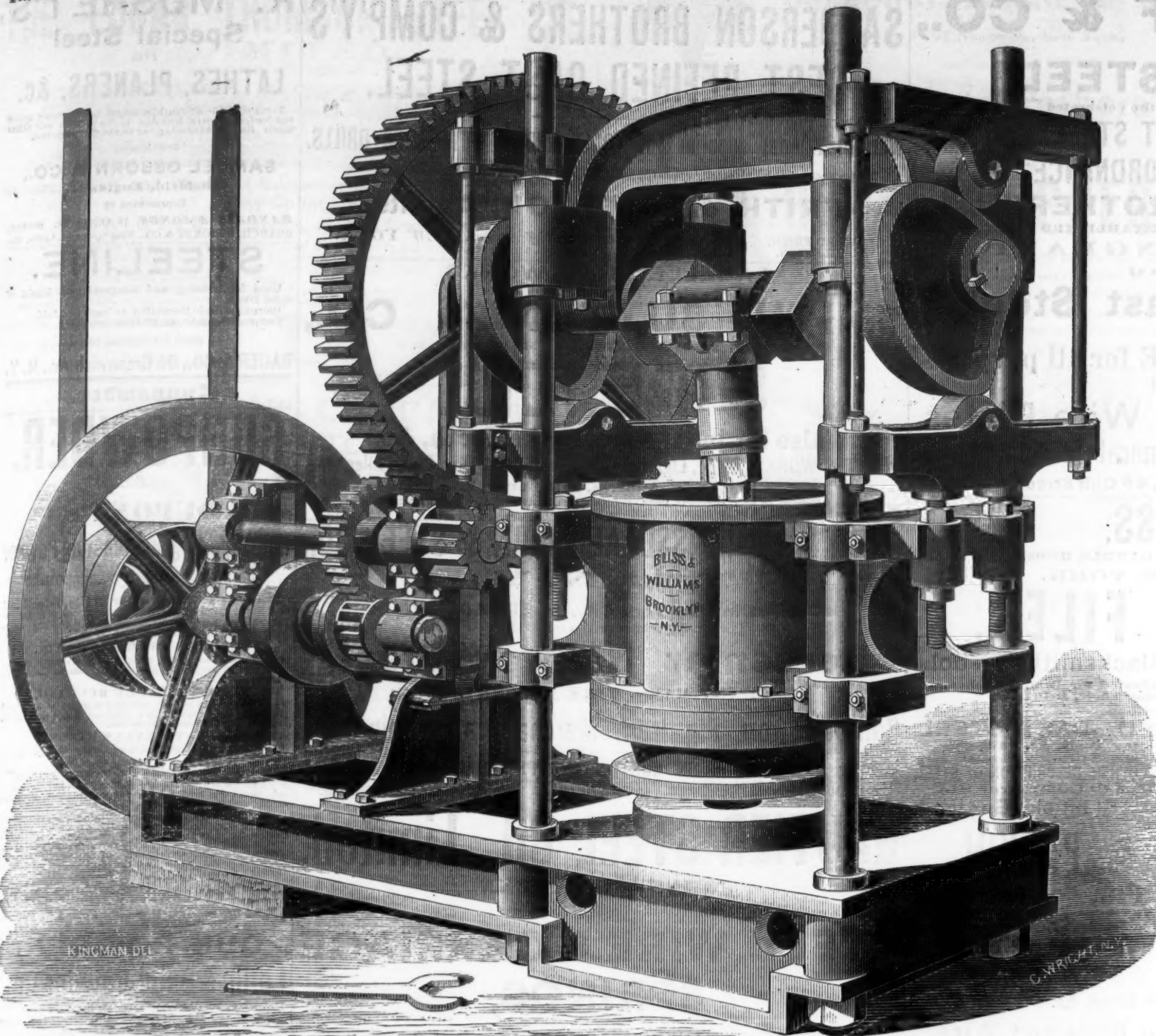
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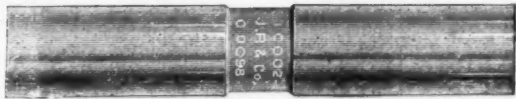
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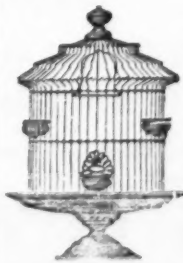
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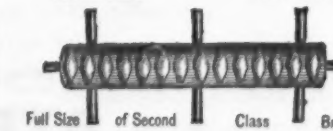
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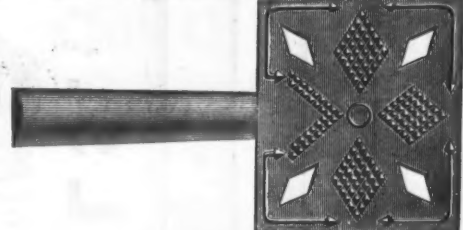
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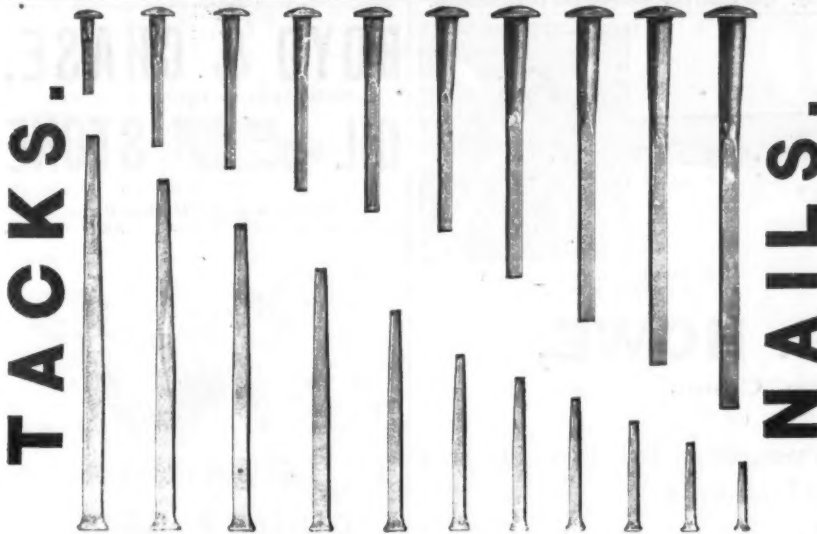
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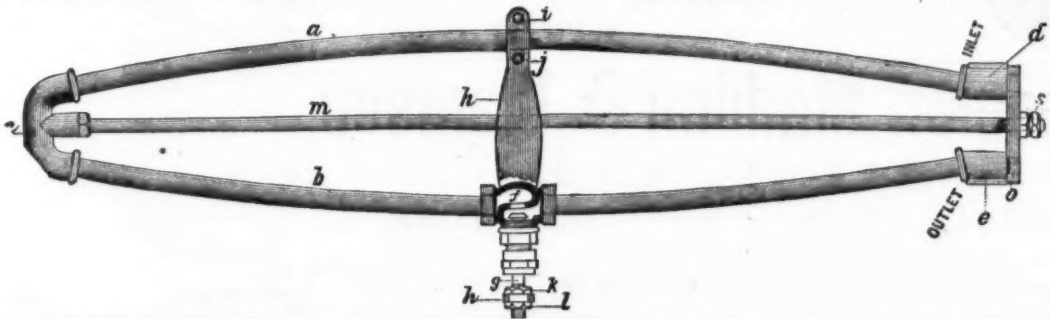
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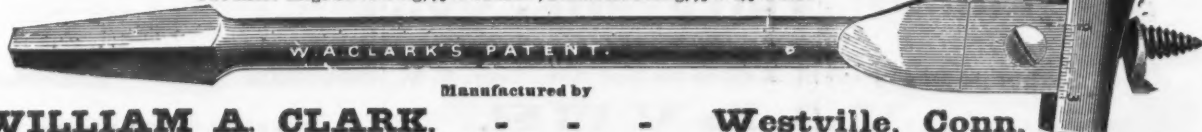
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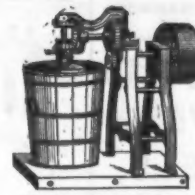
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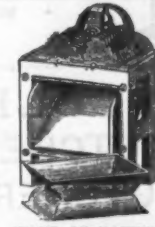
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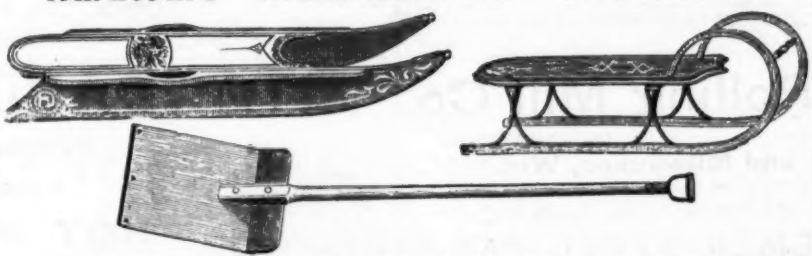
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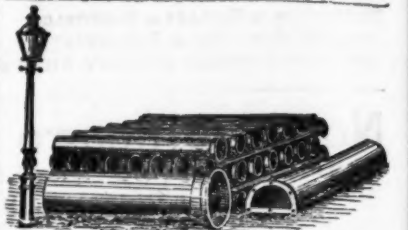
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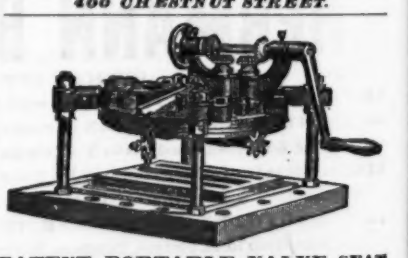
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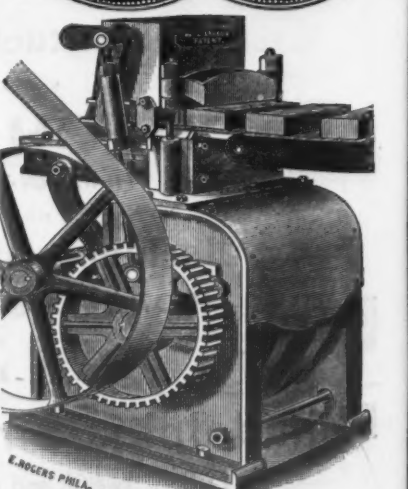
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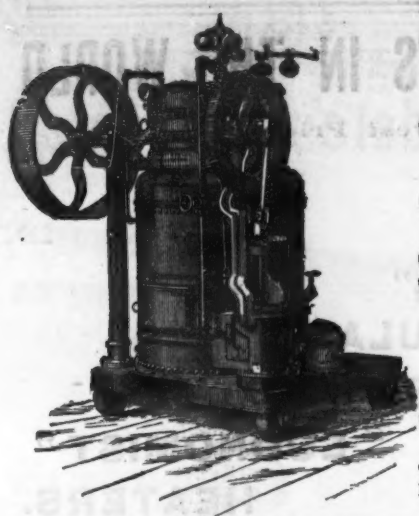


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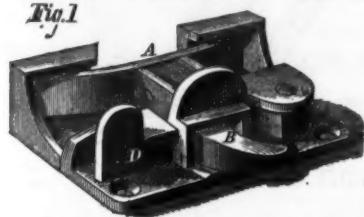
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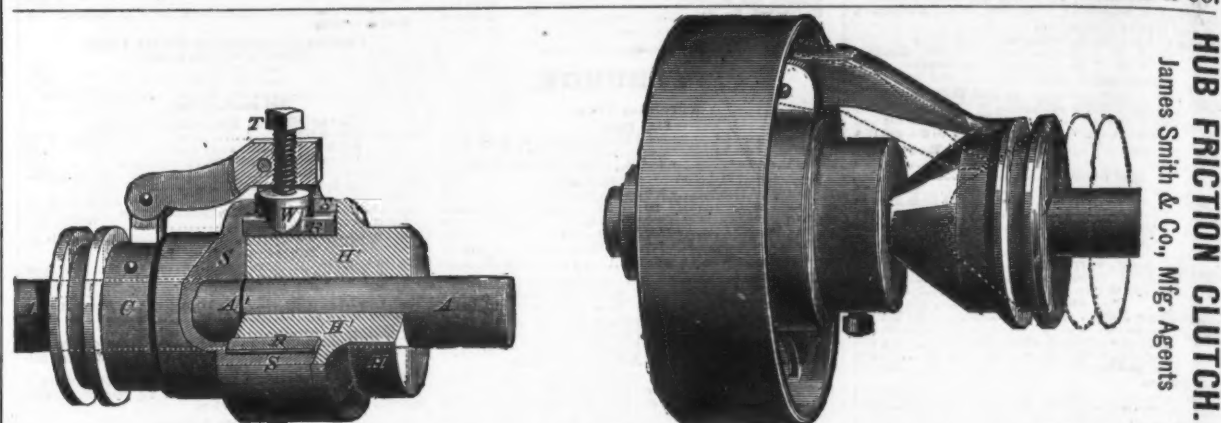
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Price List, October 1-1, 1876. ANVILS weighing 100 lbs. to 800 lbs., 9c. per lb. Smaller Anvils, "Minims."

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Machinery, &c.

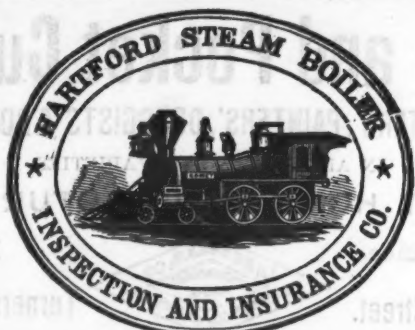
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It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in durable other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior Governors, pay higher prices than those shown in the accompanying list. We guarantee the Judson Governor will do all any other Governor can do, and in accuracy and durability—the main essentials—we guarantee it shall do more.

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Size, In.	Plain.	Patent.	Patent.	Patent.	Stop Valve.
1 1/4	\$15.00	\$17.00	\$1.00
1 3/4	16.00	18.00	1.00
2	18.00	20.00	2.00	....	....
2 1/4	20.00	22.00	2.50	....	....
2 3/4	23.00	25.00	3.00	....	....
3	27.00	29.00	3.75	....	....
3 1/4	30.00	32.00	4.50	....	....
3 3/4	35.00	37.00	5.00	....	....
4	40.00	42.00	5.50	....	....
4 1/4	45.00	47.00	6.00	....	....
4 3/4	50.00	52.00	6.50	....	....
5	55.00	57.00	7.00	....	....
5 1/4	60.00	62.00	7.50	....	....
5 3/4	65.00	67.00	8.00	....	....
6	70.00	72.00	8.50	....	....
6 1/4	75.00	77.00	9.00	....	....
6 3/4	80.00	82.00	9.50	....	....
7	85.00	87.00	10.00	....	....
7 1/4	90.00	92.00	10.50	....	....
7 3/4	95.00	97.00	11.00	....	....
8	100.00	102.00	11.50	....	....
8 1/4	105.00	107.00	12.00	....	....
8 3/4	110.00	112.00	12.50	....	....
9	115.00	117.00	13.00
9 1/4	120.00	122.00	13.50
9 3/4	125.00	127.00	14.00
10	130.00	132.00	14.50

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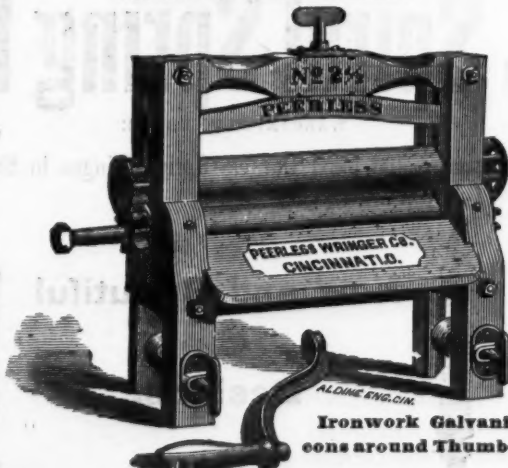
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| Fastening, | Spring Bar, |
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| Fastening Pads, | Rubber Springs. |
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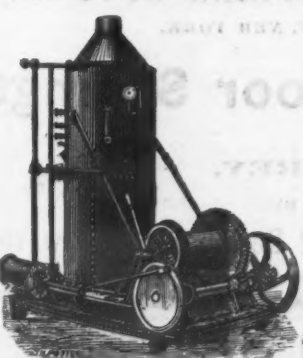
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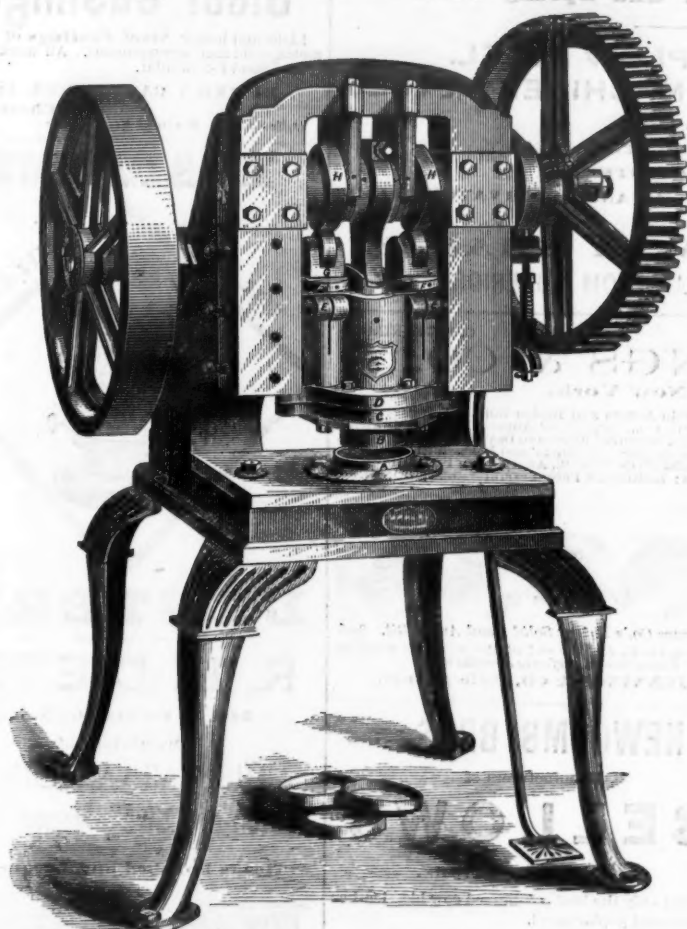


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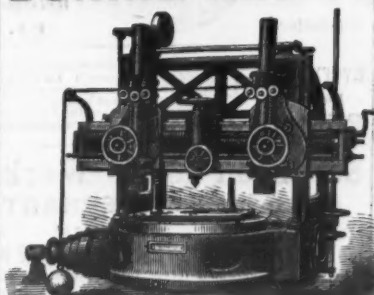
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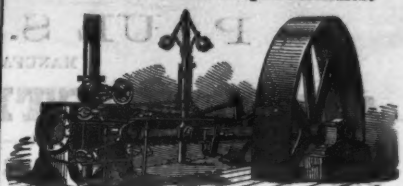
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For every possible duty. Special Pumps
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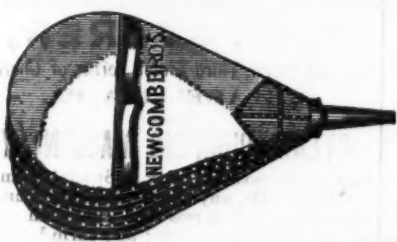
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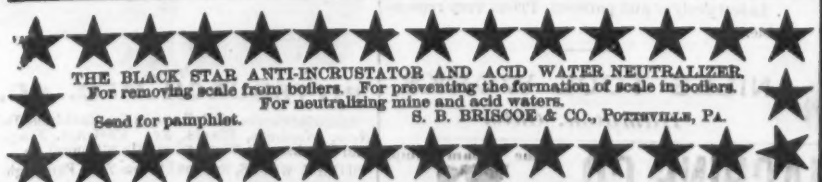
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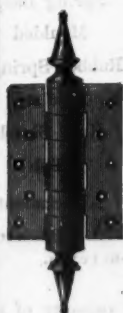
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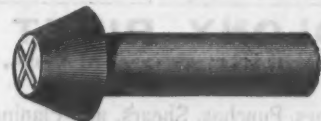
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